THE CARPOOL CLUB AT ASSUMPTION UNIVERSITY

by

Mr. Jirawat Phalanuwatr

A Final Report of the Three-Credit Course
CE 6998 Project

Submitted in Partial Fulfillment
of the Requirements for the Degree of
Master of Science
in Computer and Engineering Management
Assumption University

July, 2001

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MS (CEM)
St. Gabriel Lilrary, Au

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Project Title	The Carpool Club at Assumption University
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Academic Year	July 2001

The Graduate School of Assumption University has approved this final report of the three-credit course, CE 6998 PROJECT, submitted in partial fulfillment of the requirements for the degree of Master of Science in Computer and Engineering Management.

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July 2001

ABSTRACT

Nowadays, the traffic problem has been one of the severe problems in many big cities. And Bangkok is one of the cities where traffic problem is in the top rank. ABAC is a place that is facing this routine problem. One of the best ways that can eliminate or reduce this problem is Carpool. Carpool is a group of people who travel together especially to work or school, usually in a different member's car for each day. Carpool is cheaper and more environmentally friendly than commuting alone.

This project has been started to clarify and study the concepts and benefits of Carpool Club to ABAC students in order to persuade them to join the carpool club with the university.

The researcher collects the secondary data from many sources especially through the Internet. After necessary data have been collected, research methodology is begun. Researcher sets a set of questionnaires that combined many types of questions, which aim to ask 200 ABAC students. The questionnaire has been tested before actually launching to the students.

After collecting data from the 200 sets of questionnaires, all data are coded to the computerized program, SPSS and transformed to the optimum form to interpret. The transformed data are shown in the form of tables and figures for ease of understanding. Some cross-tabulation tables are shown and combined with the description.

Finally, the researcher concludes this research the last part, conclusion and recommendation. And the research recommends that establishing Carpool Club in ABAC, which reduces traffic problem and parking space problem, is possible. And research has explained the recommended way to establish the Carpool Club in ABAC in this part.

ACKNOWLEDGEMENTS

I am indebted to the following people, without them, this project would not be completed

The first person that I sincerely thank is my advisor, Dr. Duangnaid Narksomboon. Her assistance, advice, and guidance had led me from the beginning of the research till it finished. Her patient performance can help correct all the challenging problems of this project. She spends a lot of time to carefully advise me by word, Email, or any sources that available.

I would like to thank Miss Usa Sookdee, my best friend. Her continuous assistance can help me work more comfortably. I can get many ideas from her and all of them are useful.

The next person that I would like to thank is my sister. As MBA graduate from USA, she can help me by correcting my grammar mistakes and help me use the appropriate report writing method in this project.

I would like to thank the most important person, my mother. I am forever grateful to my mother whose willingness to invest in my future has enabled me to achieve my educational goal.

Finally, I hope that my project, Carpool Club will help ABAC to reduce the problem of traffic, limited parking space, make students life more comfortable and adapted by other organizations that have the same problems.

St. Gabriel L:7=z, Au

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I. INTRODUCTION

1.1 General Background

Nowadays, the traffic problem has been one of the severe problems in many big cities. And Bangkok is one of the cities where traffic problem is in the top rank. The Thailand Government as well as other countries that have the same problem spend a lot of money and effort to solve this problem. But these efforts don't seem to work so well. The traffic problem can lead to other problems such as stress, time consuming, fuel consuming, or increasing air and noise pollution.

There is the traffic problem appearing in ABAC as well as in other public areas. Everyday, students and faculty members spend a lot of time in ABAC driveway to find available parking lots. An hour spending time to find a parking space is not unusual. Some students have to park very far from ABAC in order to run away from the traffic problem. However, this solution may cause other problems such as risking the car to thrifts or annoying neighborhood.

One thing that is obviously seen is that a few car parks are available for students or faculty members, but there are always available seats in the vehicles. As we realize this fact, Carpool is introduced to eliminate the traffic problem. Carpool is a group of people who travel together especially to work or school, usually in a different member's car for each day. It can be called ride sharing. Carpool is cheaper and more environmentally friendly than commuting alone in your car every day. The official name of Carpool is High Occupancy Vehicle (HOV) but the name Carpool is more popular.

In USA and EU, carpooling or vanpooling (In USA, van is a popular vehicle for a family.) is very popular. There are many carpool campaigns to persuade people to change theirs lifestyle from using Single Occupancy Vehicle (SOV) or drive alone to HOV or Carpool. They are nine demonstration sites in EU that have ICARO projects (Increase CAR Occupancy) such as in Leeds City, Great Britain. They are many organizations in USA that provide web sites that give free carpooling services for people in their community. These services include roadmap, list of carpool members, their route, or trip for establishing practical carpool club. Some web sites such as http://www.bchydro.bc.ca provide the financial calculation that show the amount of money that we can save when using carpool.

ABAC does not have a formal carpooling system yet. But many universities in USA are successfully implemented carpooling programs. The example of success carpooling program is in University of Wisconsin Madison and Cornell. Other examples is The University of Washington's U-Pass transportation plan. It is a paradigm of the integrated transportation movement, which maximizes employee carpooling.

The Carpool concept can be applied in ABAC to reduce traffic problems. The purpose of this research is to clarify the concepts and benefits of Carpool Club to ABAC students in order to persuade them to join the carpool club with the university.

1.2 Statement of Problem

Focused problems of this project are given as follows:

(1) Do ABAC students in different academic years have different behaviors in commuting to ABAC?

(2) Do ABAC students in different genders have different attitudes toward Carpool Club?

(3) Do ABAC students in different academic years have different attitudes toward Carpool Club?

(4) Do ABAC students in different genders have different attitudes and behaviors toward parking around ABAC?

1.3 Limitation

In doing this project, there are some limitation that occurred.

(1) Time limitation: this is 4-month project therefore we cannot ask students in depth.

(2) Budget limitation: the budget is considered insufficient to cover all costs of a perfect research.

(3) Fear of answering English questionnaires for some young respondents who have poor English skills.

(4) Lack of research team members, which is needed to help distribute questionnaires to the respondents.

(5) Finally, the researcher can pass through all obstacles to finish this project

1.4 Objective

(1) To survey the behavior of ABAC students on how they commute to The University.

(2) To investigate attitude of ABAC students toward Carpool Club.

(3) To search influence factors on the success of Carpool Club.

(4) To utilize the research information to establish the Carpool Club that is suitable for ABAC students.

(5) And to reduce the traffic problems in ABAC.

1.5 Important of the Study

The researcher believes that this project will benefit all ABAC students and everybody that will be indirectly beneficial.

(1) The Carpool Club is appropriately adjusted to fit the behavior and attitude of most ABAC students.

(2) The Promotion Program of Carpool Club can persuade ABAC students to become members of the club.

(3) Reduce the traffic problems in ABAC Huamark campus and surrounding areas.

(4) Reduce air pollution in the Huamark campus and surrounding areas.

(5) Reduce noise pollution in the Huamark campus and surrounding areas.

1.6 Methodology

(a) Determining Research Populations

Total population of this research covers all ABAC students who:

(1) Study in the undergraduate programs.

(2) Study in the day programs.

(3) Study in the Huamark campus.

(4) Study in all faculties.

(5) **Both** male and female.

(6) All ranges of age.

(7) Do not commute to ABAC by foot or public transportation.

(b) Determining Research Sample

As the total population is unknown, the quota sampling is used to define the sampling size. The researcher designs to set 200 prospects as the target group. In that amount, the target group is divided into 4 subgroups as follows:

1st Academic Year	50	(male =25, female=25)
2nd Academic Year	50	(male =25, female=25)
3rd Academic Year	50	(male =25, female=25)
4th Academic Year	50	(male =25, female=25)

(c) Determining Data Collection

The researcher applied the interview survey as a way of data collection. The questionnaire has been designed as a medium to communicate between the researcher and the respondents. Pretest of the questionnaire has been done before the field launch to find and correct the possible mistakes on the questionnaire.

(d) Determining Data Analysis

(1) Questionnaire has been designed to ask the 200 respondents about their commuting behavior, attitude, and preference to a Carpool Club. 26 Close-ended questions and one open-ended question are used.

(2) Raw data are edited to collect some mistakes and prepare the coding

(3) Data are coded using the SPSS computer program.

(4) Data are shown in frequency and percentage.

(5) The statement problem can be answered by the data analyzing.

(6) Conclusion and recommendations to the focused problem in the last chapter.

II. LITERATURE REVIEW

2.1 Historical perspective on Carpool

Carpool is a group of people who travel together especially to work or school, usually in a different member's car for each day. It can be called ride-sharing. Carpool is cheaper and more environmentally friendly than commuting alone in your car every day. Carpools existed long before exclusive lanes and other facilities were set aside to give carpooler a relative advantage over driving alone. Although the term "high occupancy vehicle" had not been invented in the early years of the automobile, most automobiles operated most of the time at high occupancies; the scarcity of vehicles, fuel, roads and parking areas required it. In fact, many cars prior to the 1950s were designed to accommodate five or six occupants in relative comfort. Economic necessity made carpooling a routine part of life by being more economically and environmental friendly.

The larger families of that era typically "piled into the family car." Neighbors would share the ride to work, school, grocery shopping, the movies, and so on. Employers, schools, and clubs helped connect drivers with potential riders. Hitchhiking was common and encouraged. Wartime gasoline rationing encouraged ridesharing, as did publicity campaigns. One World War II era advertisement portrayed the grim message,

"If you ride alone, you ride with Hitler!"

But this tradition was greatly weakened by postwar policies to build roads and parking lots and to encourage an automobile-dependent lifestyle. As the two-car family, the three-car garage, and free parking at work became commonplace, carpooling declined. According to the 1990 U.S. census (www.fta.dot.gov 2000), average vehicle

occupancy for commuting has dropped to 10.9, the lowest level ever recorded. Between 1980 and 1990-when the nation's civilian workforce was increasing by 18.6 million average daily carpools to work declined from 19 million to 15 million. The largest declines occurred in carpools of four or more (over 50 percent decline) and three (almost 40 percent decline). Even two-person carpools for commuting went down by ten percent. Between 1980 and 1990 daily transit ridership to work also declined slightly to six million; solo driving was the only commuting mode that increased, to a record- high 84.2 million-three quarters of all trips.

The decline in ridesharing has coincided with unprecedented governmental peacetime efforts to promote ridesharing. In the energy crises of the 1970s, telephone services were established to encourage ridematching. By the 1990s, many large companies had programs to encourage their employees to take transit, vanpools, or carpools, with such incentives as free or lower-cost parking.

Even as carpools decreased in the 1970s, a new term emerged, "high occupancy vehicle." It seems doubtful that the average carpooler or busrider prefers this term (HOV). More common in public parlance are terms like "carpool lane" or "busway," even though the lanes often combine both buses and carpools and (in off-peak periods) single occupancy vehicles.

2.2 History of High Occupancy Vehicle (HOV) Facilities

Early in this last century, streetcars has a lot of roads to run. As rails were paved over, the buses that replaced the streetcars generally shared the lanes with other motor vehicles. As bus service began to suffer from the growing traffic congestion, buses were given their own lanes. Apparently the earliest U.S. instance was in 1939, with establishment of more than a mile of lanes on Chicago's North Sheridan Road to bus-

only during peak traffic flow periods in the direction of peak flow; local traffic was still allowed on the lanes.

The number of bus-only lanes throughout the country increased particularly in the 1960s and 1970s, with some on a 24-hour basis. Freeway lanes and ramps have also been set aside for buses. One of the first bus lane in 1962 was a lane in each direction on the San Francisco-Oakland Bay Bridge for bus and construction traffic when the bridge was being rebuilt to pave over the existing passenger rail tracks. Bus patronage across the bridge increased, but went down again when the lanes were restored to general purpose traffic upon completion of the rebuilding.

This omission was partially corrected in 1970 when a bus lane was established on the eastern approach to the bridge; alongside it, two additional lanes were also set aside for carpools in 1971. Another early case was a morning bus-only lane on the New Jersey Turnpike approaching the Lincoln Tunnel into Manhattan.

The first U.S. freeway lanes built solely for buses were probably the Shirley Highway Busway in Northern Virginia, 1969. In 1973, the busway was opened to carpools, apparently the first U.S. instance in which buses and carpools officially shared a HOV lane. HOV lanes on freeways have spread, and now can be found in more than 20 urban areas of the United States and Canada, with projects in other areas being planned

In Thailand, HOV lane, carpool lane or diamond lane was introduced in 1993 by the vice-premier Taksin Chinnawat. The HOV lanes allow bus and carpool which has 3 or more passengers (3+). These carpool lanes are still used in some streets in Bangkok.

In 1999, the governor of Bangkok, Dr. Pijit Rattakun has a campaign to encourage solo-driver to become carpooler by persuading people not to pass some area if the car creates air pollution or solo-drive. But this program is just a campaign, it

cannot become a law. So that, this campaign works only in the beginning period same as other firecracker programs. Now people can see the signs that persuade people in many places such as Rajchaprarop Road, Ramkhamheng, Silom, etc.

2.3 Types of HOV Facilities

There are types of HOV facilities that are currently used in USA:

(1) Exclusive HOV Facility, Separate Right-of-Way

A roadway or lane developed in a separate right-of-way and designated for the exclusive use by high-occupancy vehicles. Most facilities of this type are designed and utilized by buses only. Most are two-lane, two-direction facilities. Examples of this type of HOV treatment are the South and East Busways in Pittsburgh and the Ottawa transitway system in Canada.

(2) Exclusive HOV Facility, Freeway Right-of-Way

A lane(s) constructed within the freeway right-of-way that is physically separated from the general purpose freeway lanes and used exclusively by HOV for all, or a portion of, the day. Most exclusive HOV facilities are physically separated from the general purpose freeway lanes through the use of a concrete barrier. However, a few exclusive facilities are separated from the general purpose lanes by a wide painted buffer. An example of this type of treatment is the 1-84 HOV lanes in Hartford that utilize a 15-foot painted buffer to separate the HOV and mixed traffic lanes. Facilities of this type are usually open to all types of HOV. Examples of this type of HOV treatment include the Houston transitways and the Shirley Highway HOV lanes in the northern Virginia/Washington, D.C. area.

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(3) Concurrent Flow Lane

A freeway lane in the peak direction of travel, not physically separated from the general-purpose traffic lanes, designated for the exclusive use by HOV for all or a portion of the day. Concurrent flow lanes are usually, although not always, located on the inside lane or shoulder. Paint striping is a common means used to delineate these lanes. HOV facilities of this type are usually open to buses, vanpools, and carpools. Examples of concurrent flow lanes are SR 520,1-5 and 1-405 in Seattle, Route 55 in Orange County, and Route **101** in San Jose, California.

(4) Contralflow Lane

A freeway lane in the off-peak direction of travel, commonly the inside lane, designated for exclusive use by HOV traveling in the peak direction. The lane is typically separated from the off-peak direction general-purpose travel lanes by some type of changeable treatment, such as plastic posts or pylons that can be inserted into holes drilled in the pavement. Contralflow lanes are usually operated during the peak-periods only; many operate only during the a.m. peak-period and then revert back to normal use in non-peak periods. Examples of this type of facility include the approach to the Lincoln Tunnel on Route 495, the Long Island Expressway, and the Gowanus Expressway; all of these are located in the New York/New Jersey area.

2.4 Example of HOV Facilities Currently Used in USA

(1) Katy Freeway - Houston, Texas

The Katy Freeway HOV lane is located on Western Houston, Texas (www.rides.org 2000). The location of this facility, which serves as the

major travel corridor on the west side of the city. The 13-mile HOV lane was opened in stages between 1984 and 1990. It is a one-lane, barrier separated, reversible HOV lane located in the freeway median. Three park-and-ride lots and three park-and-pool lots are located in the corridor. Access and egress is provided by both slip ramps and direct access ramps. The Katy Freeway HOV lane is one of four operational HOV lanes in the Houston area and is part of a planned 96-mile HOV network. The HOV lane is open in the inbound direction from 4:00 a.m. to 1:00 p.m. It is then closed from 1:00-2:00 p.m. to reverse the flow of HOV traffic. The lane reopens at 2:00 p.m. and operates in the outbound direction until 10:00 p.m.. The vehicle occupancy requirement on the facility has changed a number of times over the life of the project. Only buses and authorized vanpools were allowed to use the facility when it opened in 1984. Due to low utilization, it was opened to authorized carpools with four or more persons in April 1985. The occupancy requirement was lowered to 3+ in December 1985, and in August 1986 it was changed to 2+ and the authorization requirement was dropped.

The 2 + occupancy requirement remained in effect until the fall of 1988. In response to the high volumes occurring in the morning peak hour, and the corresponding decline in travel speeds and travel time reliability, a 3+ vehicle occupancy requirement from 6:45-8:15 a.m. was reinstated in October 1988. The 3+ hours were slightly revised to 6:45-8:00 a.m. in May 1990, and in the fall of 1991, the 3+ requirement was applied to the afternoon peak hour from 5:00-6:00 p.m.

The historical trends in vehicle volumes and person movement during the morning peak hour are show the change in utilization levels over an eight-year period. The vehicle volumes grew steadily after the lane was opened to 2+ carpools, reaching a high of almost 1,500 peak-hour vehicles in 1986. The vehicle and person volumes dropped initially after implementation of the 3+ occupancy requirement, but have been increasing since that time. As of December 1991, approximately 840 vehicles and 4,000 persons were using the HOV lane during the morning peak hour. In the peak period (6:00-9:30 a.m.) approximately 2,350 vehicles and 8,760 persons were using the lane.

(2) 1-394 - Minneapolis, Minnesota

The 1-394 freeway and HOV lanes are located on the western side of the Minneapolis-St. Paul metropolitan area. The facility extends 11 miles from downtown Minneapolis to the city of Wayzata. 1-394, which represents the final segment of the interstate system to be completed in the area, was constructed on the alignment of an existing arterial, US 12. Completed in the fall of 1992, the final freeway and HOV design includes two general-purpose traffic lanes in each direction and two different HOV treatments. East of Highway 100, a three-mile, two-lane, barrier-separated, reversible HOV facility is located in the median of the freeway. Those HOV lanes provide direct access into the downtown parking garages built as part of the overall project. West of Highway 100, eight miles of concurrent flow HOV lanes are in operation.

An interim HOV lane was used during construction of the 1-394 facility. The interim facility was implemented to help manage traffic during

construction and to introduce the HOV concept in the area. The interim HOV lane was approximately three miles long, and was located in the median of US 12. Opened in November 1985, the interim HOV lane operated in the inbound direction during the morning peak period (6:00-9:00 a.m.) and in the outbound direction in the afternoon (2:00-7:00 p.m.). The operating hours changed slightly during the interim period in response to construction needs. A 2 + vehicle occupancy requirement has been in effect over the life of the project, and buses, vanpools, and carpools are allowed to use the facility.

For the morning peak-hour vehicle and person volumes for the 1-394 HOV lanes, the interim HOV lane was in operation for approximately five years. During this time, an average of some 500 vehicles carrying 1,400 persons used the facility during the morning peak hour. In the fall of 1992, approximately 1,100 vehicles carrying 3,580 persons were using the peak-direction concurrent flow HOV lane west of Highway 100 during the morning peak.

Route 55 - Orange County, California

The Route 55 HOV (High Occupancy Vehicle) lanes in Southern California serves as a heavily-traveled link between the residential areas in Eastern Orange and Riverside Counties and the employment centers in central Orange County. Eleven miles of HOV lanes or commuter lanes as they are called locally were opened on Route 55 in 1985. The Route 55 HOV facility consists of a pair of concurrent flow commuter lanes (one in each direction), and is open to buses, vanpools, and carpools on a 24-hour

basis. A 2 + vehicle occupancy requirement is in effect on the Route 55 HOV lanes.

The historical morning peak-hour, peak-direction vehicle volumes and person movement on the Route 55 HOV lanes are show that the vehicle volumes have been relatively consistent over the eight-year period, averaging between 1,100 and 1,500 vehicles during the morning peak hour in the peak direction. However, morning peak-hour vehicle volumes as high as 1,600 have been recorded on the Route 55 HOV lane. The corresponding person movements have also remained relatively constant over this period, averaging between 2,300 and 3,200 persons during the morning peak hour in the peak direction. Since very little bus service is provided in the Route 55 corridor, the vehicle volumes and person movements for the HOV lanes primarily reflect carpools

(4) 1-279 - Pittsburgh, Pennsylvania

The location of the 1-279 HOV lanes is in Pittsburgh. The project is a four-mile, two-lane, reversible, barrier-separated HOV facility located in the median of 1-279. Two short one-lane segments are located at the southern end of the facility, providing access to Three Rivers Stadium via 1-579 and the downtown area via 1-279. The freeway and HOV lanes were first opened in August of 1989. The HOV lanes were open to buses, vanpools, and 3+ carpools during the first three years of operation. In August 1992, a demonstration project was implemented in which the vehicle occupancy requirement on the HOV facility was lowered to two or more persons per vehicle.

The 1-279 HOV lanes operate in the inbound direction from 5:00 a.m. to noon. From noon to 2:00 p.m. the lanes are closed to reverse the flow of HOV traffic. From 2:00-8:00 p.m. the lanes operate in the outbound direction with the HOV restrictions. Finally, from 8:00 p.m. to 3:00 a.m. the lanes operate in the outbound direction with no vehicle occupancy restrictions. This is done in part to accommodate traffic leaving events at Three Rivers Stadium.

Information on the morning peak-hour vehicle and person volumes for the 1-279 HOV lanes is showthat, with the 3+ occupancy requirement, the morning peak-hour vehicle volumes had increased from approximately 164 vehicles in November 1989 to 345 vehicles in November 1991. The corresponding peak-hour person volumes had increased from some 1,100 persons to 2,200 persons.

After the vehicle occupancy requirement was lowered to 2+ for a demonstration project in August 1992, the morning peak-hour volume increased to 868 vehicles and the corresponding person movement rose to 2,600.

(5) 1-5 North - Seattle, Washington

The location of the 1-5 North HOV lanes is in Washington. The concurrent flow HOV lanes are located to the north of both downtown Seattle and the University of Washington. The southbound HOV lane is 7.7 miles in length and the northbound HOV lane is 6.2 miles in length.

The 1-5 North HOV lanes were opened in 1983 and are operated on a 24-hour basis. From 1983 until July 1991, a 3+ vehicle occupancy requirement was in effect. On July 29, 1991, the occupancy requirement

was lowered to two or more persons per vehicle as part of a demonstration project.

The historical trends in morning peak-hour, peak-direction vehicle volumes and person movement on the 1-5 HOV lanes are show that an average of about 280 vehicles used the facility during the morning peak hour in the first few weeks following the opening of the facility. That volume had grown to 410 vehicles after the first three months of operation and 460 vehicles after the first 20 months.

Between 1985 and August 1991, an average of 460 to 550 vehicles used the HOV lane during the morning peak hour in the peak travel direction. After initiation of the demonstration project lowering the vehicle occupancy requirement to 2+, the morning peak-hour, peak-direction volumes averaged between 1,200 and 1,400 vehicles.

Between 1985 and 1991, an average of 3,710 persons used the facility during the morning peak hour in the peak travel direction. Approximately 70 percent, or 2,605 persons, rode buses on the HOV lane, while 30 percent, or 1,105 persons, were in 3+ carpools. After the vehicle occupancy requirement was changed to 2+, the person volumes increased to an average of 5,644 during the morning peak hour in the peak travel direction. Bus ridership remained relatively constant with the reduced occupancy requirement, but the number of persons carried in carpools increased to 3,039-approximately 54 percent of the total morning peak-hour, peak-direction person volume on the facility.

(6) Shirley Highway (1-395) - Washington, D.C./Northern Virginia

The opening of the initial five miles of bus-only lanes on the Shirley Highway (1-395) in 1969 represented the first use of an HOV facility on a freeway in the United States. The project, which was opened in several stages between 1969 and 1975, is now approximately 11 miles in length. The two-lane, reversible HOV facility is located in the median of the freeway and is separated from the general-purpose traffic lanes by concrete barriers. Park-and-ride lots and direct access ramps are provided at strategic points along the corridor.

A number of changes have been made in the occupancy requirements and operating hours for the Shirley Highway HOV lanes. Only buses were allowed to use the facility during the first four years of operation. In December 1973, the HOV lanes were opened to vanpools and carpools with four or more persons. In January 1989, a 3+ carpool definition was implemented for the facility.

Until 1985, the lanes operated in the inbound direction from 11:00 p.m. to 11:00 a.m. and in the outbound direction from 1:00-8:00 p.m. The lanes were closed for maintenance and reversing the flow of HOV traffic during other hours. As a result of a Congressionally-mandated demonstration project in the spring of 1985, the operating hours of the HOV lanes were changed to 6:00-9:00 a.m. in the inbound direction and 3:30-6:00 p.m. in the outbound direction. The lanes are open to general-purpose traffic during the remainder of the day, except when they are closed to reverse the flow of traffic.

Bus service levels and service orientation were changed in 1983 with the opening of the Metrorail Yellow Line, resulting in a slight decline in vehicle and person volumes on the HOV lanes.

The historical morning peak-hour vehicle and person volumes for the Shirley Highway HOV lanes are show that an approximately 39 peak-hour buses, carrying some 1,920 persons, used the HOV lanes during the first year of the project. By 1974, that number had increased to 279 buses and 11,340 passengers. As of 1991, the morning peak-hour volume for buses, vanpools, and carpools was approximately 2,773 vehicles, carrying some 18,406 persons.

2.5 American policy on HOV facilities

Beginning in the 1970s, officials in the Urban Mass Transit Administration (now the Federal Transit Administration) recognized the advantages of exclusive transit lanes and encouraged their funding-indeed sometimes in preference to rail lines. In the 1970s the Federal Highway Administration (FHWA) began to allow (but did little to encourage) state highway agencies to spend federal funds on HOV lanes. This policy changed with an October 1990 memorandum from the administrator stating that, "FHWA strongly supports the objective of HOV preferential facilities and encourages the proper application of HOV technology." Regional administrators were directed to promote HOV lanes and related facilities.

Two laws in the early 1990s cemented a national commitment to HOV lane construction. The Clean Air Act Amendments of 1990 listed HOV lanes as one of the transportation control measures that could be included in state implementation plans to attain federal air quality standards. The 1990 amendments also deny the administrator of the Environmental Protection Agency the authority to block FHWA from funding 24-

hour HOV lanes as part of the sanctions for a state's failure to comply with the Clean Air Act, if the secretary of transportation wishes to approve the FHWA funds. Withholding of FHWA funds for most other roadway capacity improvements is a sanction available to the EPA administrator without being blocked by the secretary of transportation.

The Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 established some new cautions in the federal funding of general purpose lanes. Yet ISTEA encouraged the construction of HOV lanes, which were made eligible for Congestion Mitigation and Air Quality (CMAQ) funds in regions not attaining federal air quality standards. CMAQ funds may be spent on new HOV lane construction, even if the HOV designation holds only at peak travel times or in the peak direction. ISTEA also provided that under the Interstate Maintenance Program, only HOV projects would receive the 90 percent federal matching ratio formerly available for the addition of general purpose lanes. And ISTEA permitted state authorities to define an HOV as having a minimum of two occupants (HOV-2).

Until overruled by Congress, FHWA had insisted that 2+: accomplishes little more than rearranging traffic in lanes according to number of occupants. The number of vehicles using the HOV lane may increase but this is offset by a decrease in the average vehicle occupancy in the other lanes. Use of HOV-2 does not generally accomplish the purpose for which priority treatments are implemented; i.e., to move more people in fewer vehicles and encourage people to use high occupancy vehicles.

During the ISTEA debates, Congress did not adopt a proposal by Senator Daniel Patrick Moynihan that would have required states to return a portion of any federal funds used to construct an HOV lane if the lane were later converted to general purpose use. ISTEA also did not give preference to conversion of general purpose lanes as a

means to establish HOV lanes. There is no explicit requirement in the parts of ISTEA referring to HOV lanes that the conversion alternative be studied and compared with construction alternatives, although the regulations implementing ISTEA can be interpreted as requiring such a comparison.

III. RESEARCH METHODOLOGY

3.1 Introduction

For the research of Carpool Club in ABAC, a set of questionnaire was set to find the answers of statement of problem. In this chapter, all steps of research methodology included data collection, research design, Interview process for data collection and data analysis are described in detail.

3.2 Data Collection

a) Determining Population

For the total population, The researcher is interested in Huamark Campus of Assumption University, ignoring Bangna Campus because the traffic problem around Huamark Campus is in a violate level and the campus layout is surround with the villages in contrary to Bangna Campus. Total population of this research has covered all ABAC students who

(1) Study in the undergraduate programs.

(2) Study in the day programs.

(3) Study in the Huamark campus.

(4) Study in all faculties.

(5) Both male and female.

(6) All ranges of age.

(7) Do not commute to ABAC by foot or public transportation.

b) Determining Sample

The researcher observes the number of park space around ABAC to be total population is 1000. The way to be choose the sampling is Proportional Allocation. The sample size can be found by the formula of Taro Yamane. (Churchill, Gilbert 1992)

$$n = N/(1 + Ne^2)$$

Where n = the sample size

e = tolerance of sampling error

For this research not more than 6.5%

N = total population

$$n = 1000/(1 + 1000(.065)^2)$$

the sample size = 191 or 200 sample

In this number of sample size, the sampling is divided in to 4 groups and 2 subgroup as follow :

1st Academic Year	50	(male =25, female=25)
2nd Academic Year	50	(male =25, female=25)
3rd Academic Year	50	(male =25, female=25)
4th Academic Year	50	(male =25, female=25)

3.3 Research Design

In this research, the researcher used a set of questionnaires as the medium of communication of the researcher and the respondents to collect the important data as the primary data. The questionnaire has been designed to ask for data from 200 respondents in order to answer the statement of problem. This questionnaire begins with the instruction which tells the respondents about the introduction of questionnaire, the purpose of the questionnaire and the ending. The questionnaire is divided in to 2 parts;

personal data (including personal behavior) and attitude data. The number of questions is 27 questions (11 questions in the first part and 16 questions in the second part) with total of 6 pages. Most of the questions uses the nominal scale as method of measurement. One question uses the Likert scale to find the opinion of the factors. There are 13 questions ending with the open-ended question for the respondents to specify their answer and one question is fully an open-ended question. After a question has been set, some set of questionnaires have been tested as pretest to check some errors of typing logic of the question. After the pretest has been completed, the questionnaires were launched for the field study.

3.4 Interview Process for Collecting Data

After the questionnaire design step has been completed, 200 sets of questionnaire were launched to the respondents for data collection. The researcher locates the target points of asking the question at E building, A building, S building, P building, and some restaurants around Huamark Campus. The researcher uses survey as the dominant method of collecting data, because the researcher does not want the respondents to have any biases by the leading of the researcher. If the respondents do not understand the questions (Especially the respondents from 1St academic year who mostly have poorer English skills) the researcher will explain some question for the respondents in order to help them understand the questionnaire properly.

Before giving the questionnaires to the respondents, some observation techniques and screening questions have been asked to screen out the non prospective respondents. The researcher selects the prospects that wear the university uniform to ensure that the respondents are surely ABAC undergraduate students who are studying in the day programs. The set of screening questions are "Do you usually study at Bangna Campus?" and "How do you commute to ABAC, Huamark Campus?"

Finally, the researcher can collect 200 sets of responded questionnaires and move into the next step of research methodology which is data analysis.

3.5 Data Analysis

This research provides the result of each by Editing, Coding, Tabulating and finding the result which has been described as follows:

1) Editing

The role of the editing process is to identify omission, ambiguities, and errors in the respondent's response. This method is beneficial because the researcher can screen the mistakes out before the coding process is begun. A long questionnaire will make the respondent lack in cooperation, so the 27 questions in the question are as precise as possible and the respondents can answer the questionnaire without being bored. The screening questions are set to eliminate the problem of ineligible respondents who cannot give appropriate data to the researcher.

Some open-ended responses are checked and grouped. The question that requires editing process the most is the question number 27, which are open-ended question.

2) Coding

Coding process is divided into 2 parts; coding the close-ended question and coding the open-ended question. In open-ended question, coding is quite straightforward. But in close-ended question, all answers must be categorized into individual group before coding. In this process, the researcher used the computerized statistic package program, SPSS for Window, as a tool for analyzing the data. Due to the small sample size, the researcher has applied Descriptive Statistics to analyze the data. This method is normally associated with

a frequency distribution that helps the researcher summarize the information presented in form of tables, pie charts or bar charts.

3) Tabulating

The method that the researcher selected to present the information is simple tabulation. The simple tabulation presenting the frequency, the percentage and graphs for easier understanding is defined as "A tabulation can be defined as only frequency count of each question answer." (Crasic, Fox and Stout 1995)

4) Finding the results

In the last step of research methodology, the researcher attempts to find out the result of data in the form of frequency counting and percentage in order to answer the statement of problem. All of the result findings are shown in the next part of this report

IV. ANALYSIS

4.1 Overview

In the Analysis Chapter, the analysis of result and findings are discussed. The main focuses of the researcher are the behavior of ABAC students in commuting to the University, attitude of ABAC students toward Carpool Club, factors that influence the success of Carpool Club, and the use of the research to establish the Carpool Club that is suitable for ABAC students. In this chapter, the researcher will discuss the findings and answer to the statement of problem.

4.2 The objective of the Design Questionnaire

The questionnaire is divided in to 4 sections to find the following data;

(1) Personal Data

(2) Behavior Data

(3) Attitude Data

(4) Preference Data

Each section has been designed to ask the respondents in different objectives as follows:

Personal Data

This section was designed in order to define the biographical data of the focused respondents including; gender, age, academic year, income, income source, and faculty. The questions in this section are from questions number 1 to 6. The researcher focuses on ABAC students, Day program, etc.

Behavior Data

In this section, the researcher focuses on behavior of the respondents in commuting to ABAC, Huamark Campus. The questions in this section are from question number 7 to 11.

Attitude Data

In this section, the researcher focuses on the attitude of the respondents to traffic problem in ABAC and the Carpool club. The questions in this section are from question number 12 to 21.

Preference Data

This is the last section of the questionnaire. In this section, the researcher focuses on the preference of the respondents to find factors of success in ABAC's Carpool club, as well as advantages and disadvantages of carpool club. The questions in this section are from question number 22 to 27

Question No. 1

1. What is your gender?

o 1.1 Male

❑ 1.2 Female

Table 4.1. Result of Question No. 1.

	Frequency	Percentage
Male	100	50.00%
Female	100	50.00%
Total	200	100.00%

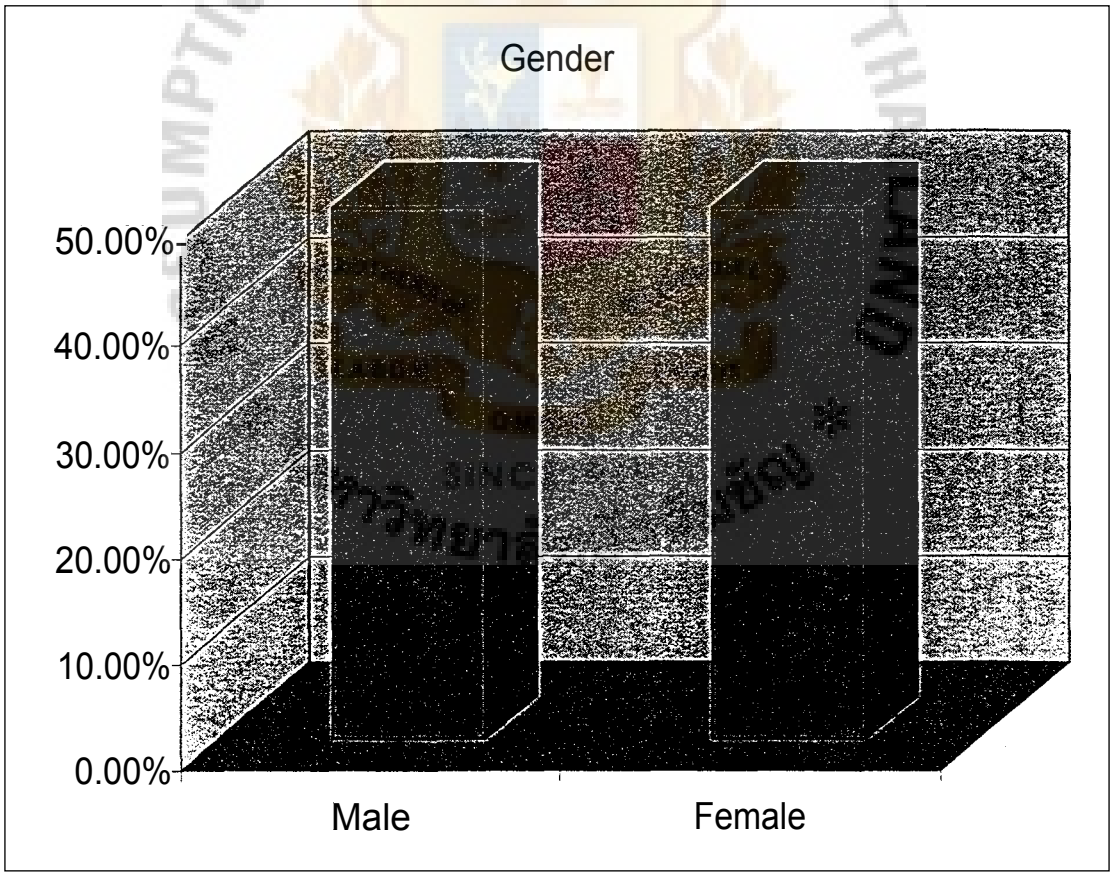

Figure 4.1. Question Number 1 and Its Result.

Question No. 2

- 2. How old are you?

❑ 2.1 Under 18

❑ 2.2 18-20

❑ 2.3 Above 20

❑ 2.4 Others, specify_____

Table 4.2. Result of Question No. 2.

	Frequency	Percentage
Under 18	18	9.00%
18-20	103	51.50%
Above 20	79	39.50%
Total	200	100.00%

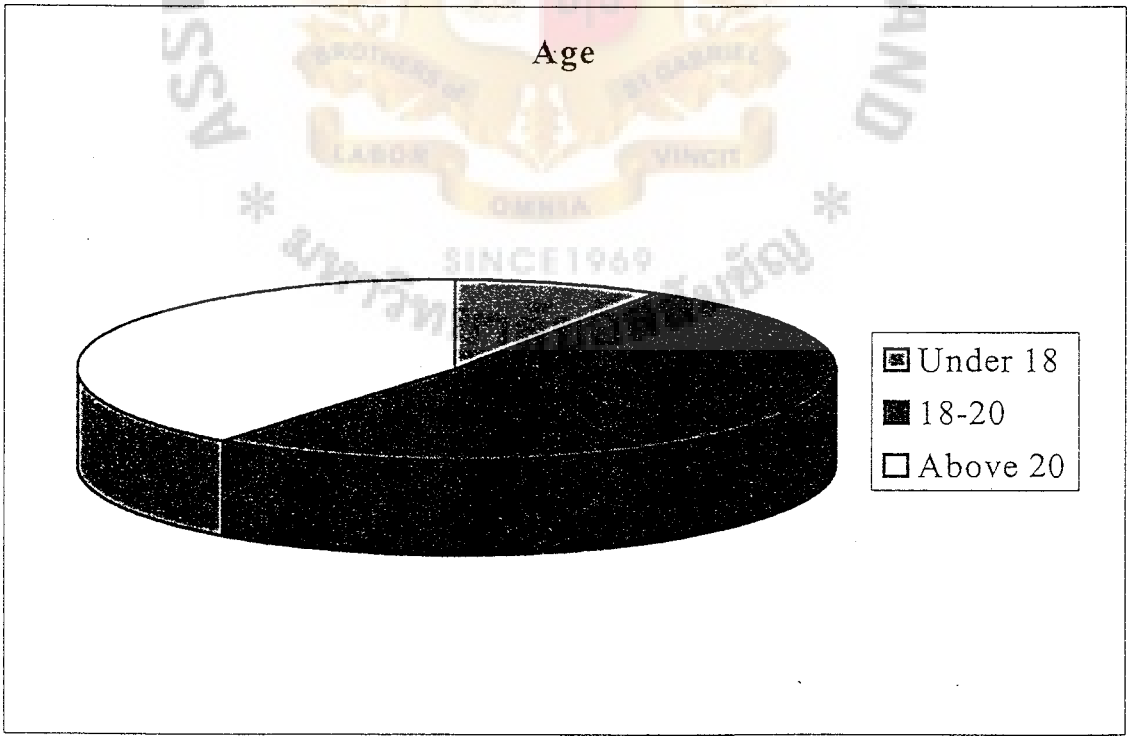

Figure 4.2. Question Number 2 and Its Result.

Question No. 3

3. What is your monthly income?

- ❑ 3.1 Below 5000
- ❑ 3.2 5001-10000
- ❑ 3.3 10001-15000
- ❑ 3.4 15001-20000
- ❑ 3.5 Higher than 20000

Table 4.3. Result of Question No. 3.

	Frequency	Percentage
Below 5000	61	30.5%
5001-10000	114	57.00%
10001-15000	19	9.50%
15001-20000	5	2.50%
Above 20000	1	0.50%
Total	200	100%

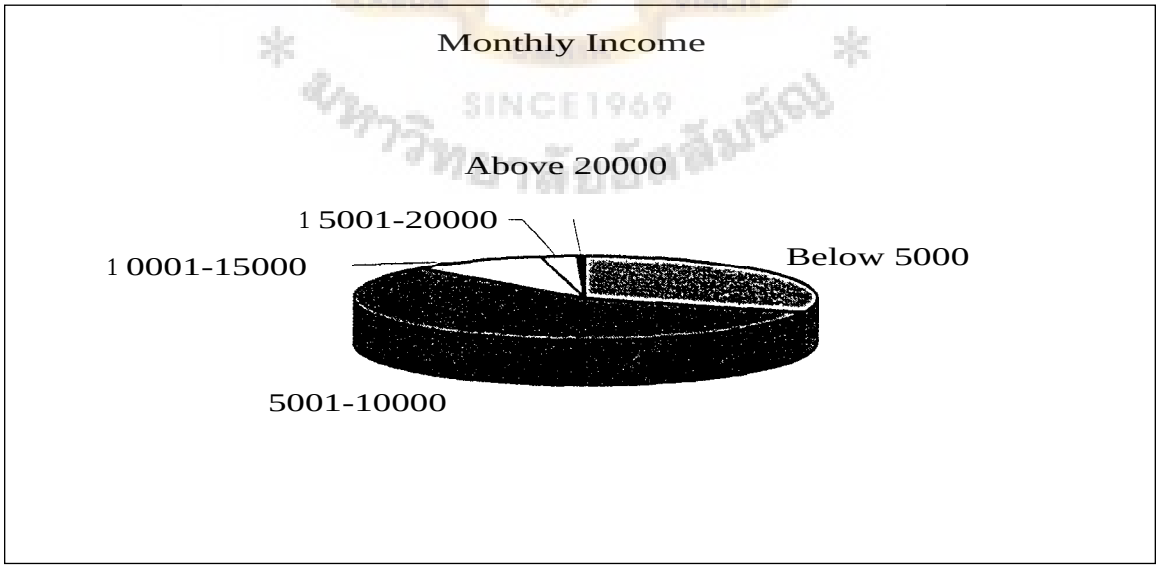

Figure 4.3. Question Number 3 and Its Result.

Question No. 4

4. What is your source of your income?

❑ 4.1 Parents

❑ 4.2 Yourself

❑ 4.3 Cousins

❑ 4.4 Others, specify_____

Table 4.4. Result of Question No. 4.

	Frequency	Percentage
Parents	193	96.50%
Myself	5	2.50%
Cousins	2	1.00%
Total	200	100%

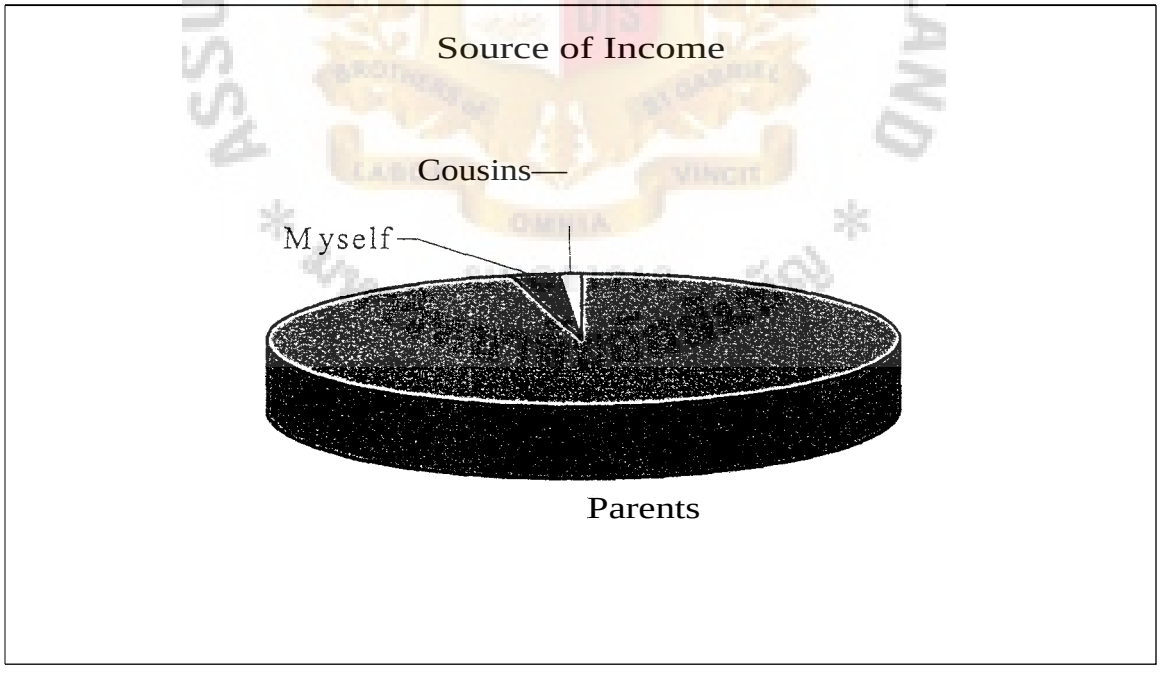

Figure 4.4. Question Number 4 and Its Result.

Question No. 5

5. What is your faculty?

❑ 5.1 BBA o 5.4 Science ❑ 5.7 Risk Management

o 5.2 Art ❑ 5.5 Nurse ❑ 5.8 Others, specify___

o 5.3 Engineering o 5.6 Law

Table 4.5. Result of Question No. 5.

	Frequency	Percentage
BBA	104	52.00%
Art	25	12.50%
Engineering	20	10.00%
Law	14	7.00%
Science	15	7.50%
Risk Management	9	4.50%
Nurse	4	2.00%
Communication Art	3	1.50%
Architect	3	1.50%
Biotechnology	3	1.50%
Total	200	100%

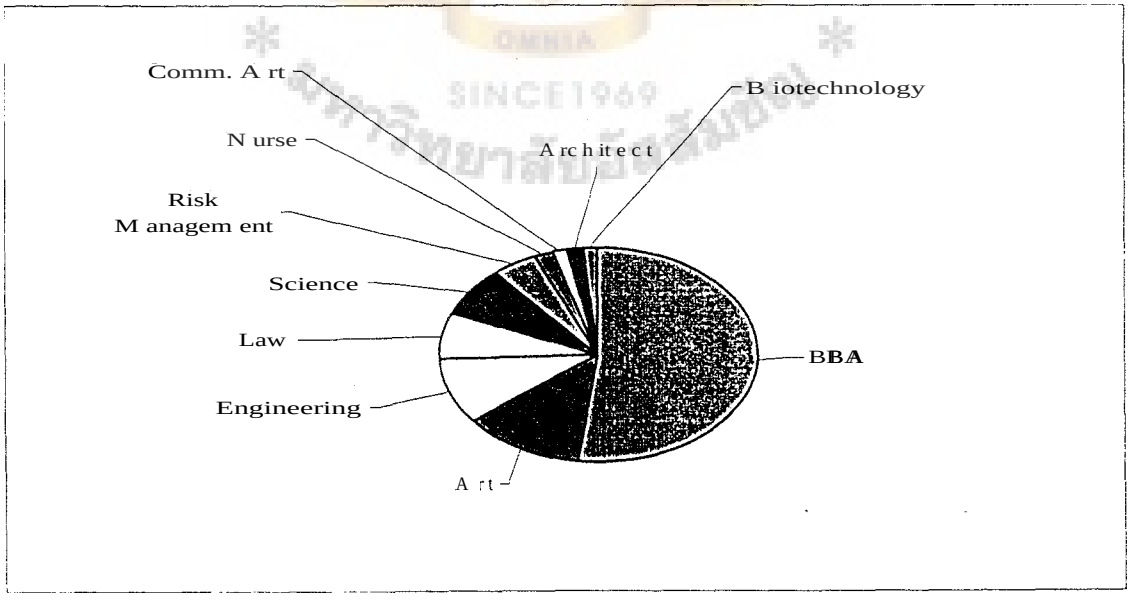

Figure 4.5. Question Number 5 and its Result.

Question No. 6

6. What is your academic year?

o 6.1 1st year

o 6.2 2nd year

o 6.3 3rd year

o 6.4 4th year

Table 4.6. Result of Question No. 6.

	Frequency	Percentage
1st year	50	25.00%
2nd year	50	25.00%
3rd year	50	25.00%
4th year	50	25.00%
Total	200	100.00%

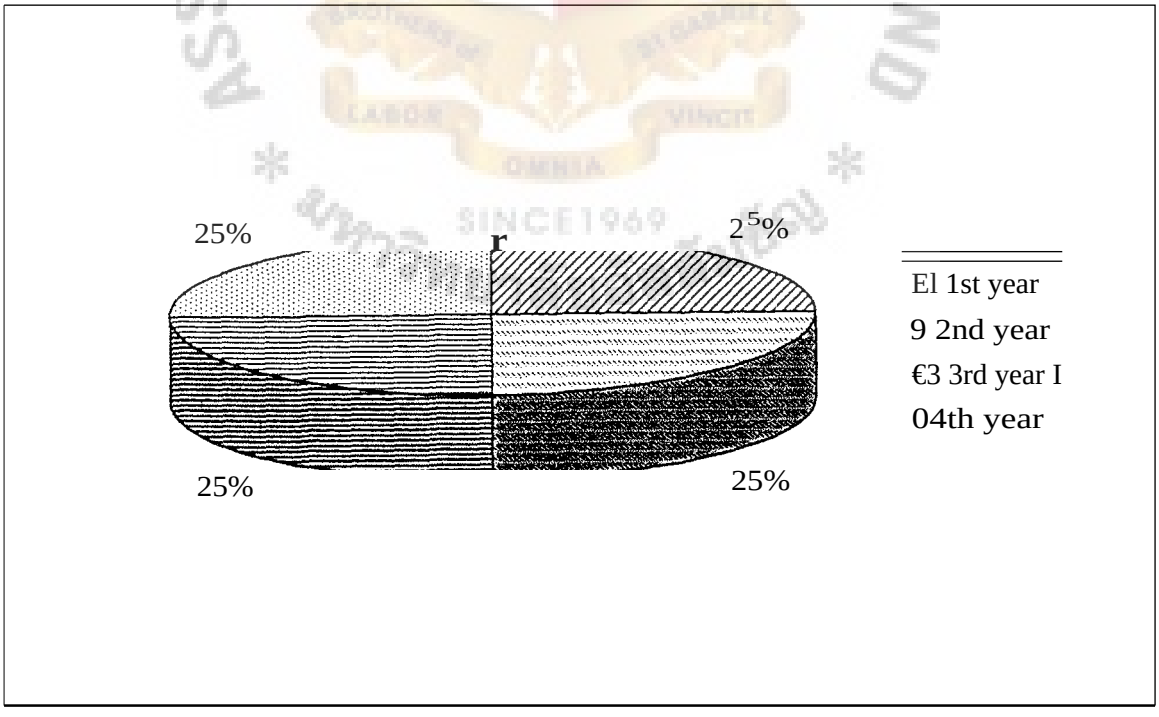

Figure 4.6. Question Number 6 and Its Result.

Result of Personal data

According to the quota sampling, the result of the gender of the respondents is fixed at 50% male and 50% female respondents.

For the gender, most respondents are from 18 to 20 years old, 57% of total respondents, while 39.5% of the respondents is above 20 years old, and 9% is under 18 years old.

For the monthly income, most respondents receive between 5,000-10,000 Bahts with the percentage of 57% followed by 30.5% of monthly income under 5,000 Bahts, 9.5% of monthly income between 10,001 to 15,000, and 2.5% of monthly income between 15,001 to 20,000 baht. Only one respondent or 0.5% has monthly income of more than 20,000 baht.

For the source of income, most respondents earn from their parents (96.5%). The rest are from other sources.

From the finding on the education of the respondents, most respondents (52%) are studying in the Faculty of Business Administration (BBA) followed by Faculty of Art (12.5%), Faculty of Engineering (10%), Faculty of Law (7.5%), Faculty of Science and Technology (7%), and Faculty of Communication Art (4.5%). The others faculties have percentage of under 2.5%.

For the academic year of the respondents, the result of the academic year is fixed due to the quota sampling. The percentage of respondents from each academic year will be 25% equally.

Question No. 7

7. How do you usually commute to ABAC (Huamark Campus)?

❑ 7.1 Drive alone

❑ 7.2 Drive with friends

❑ 7.3 Sent by home car driver

❑ 7.4 By friend car

❑ 7.5 Others, specify_____

Table 4.7. Result of Question No. 7.

	Frequency	Percentage
Drive alone	90	45.00%
Drive with friends	36	18.00%
Sent by home car driver	14	7.00%
By friend's car	47	23.50%
Others	13	6.50%
Total	200	100.00%

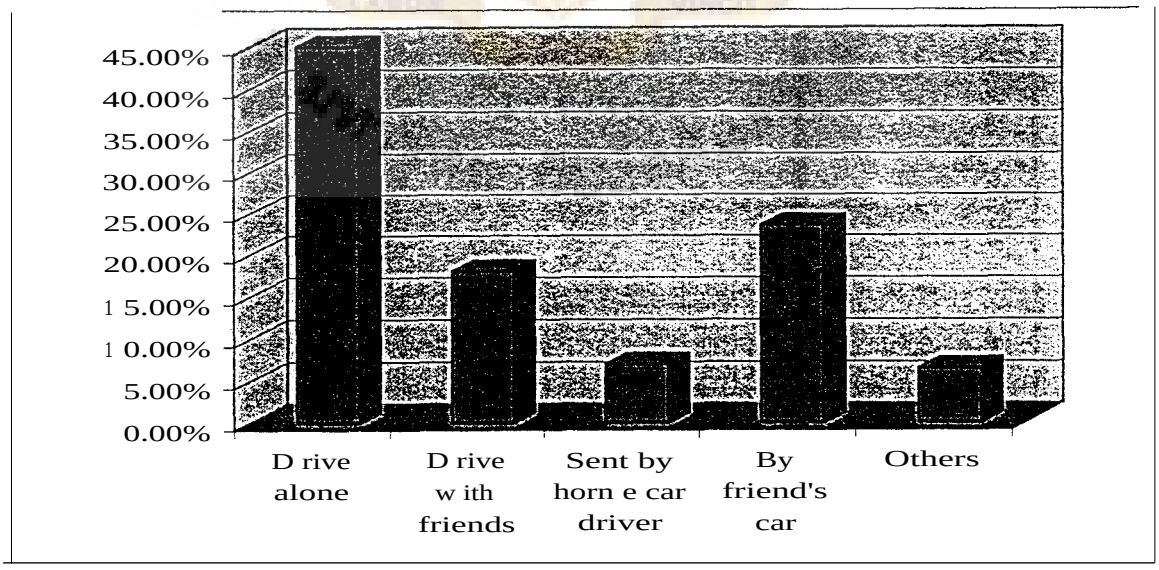

Figure 4.7. Question Number 7 and Its Result.

Question No. 8

8. How many passengers that commutes with you? (included yourself)

- ❑ 8.1 1 person
- ❑ 8.2 2 persons
- ❑ 8.3 3 persons
- ❑ 8.4 4 persons
- ❑ 8.5 5 persons and Above

Table 4.8. Result of Question No. 8.

	Frequency	Percentage
1 person	93	46.50%
2 persons	64	32.00%
3 persons	20	10.00%
4 persons	9	4.50%
5 persons and above	14	7.00%
Total	200	100.00%

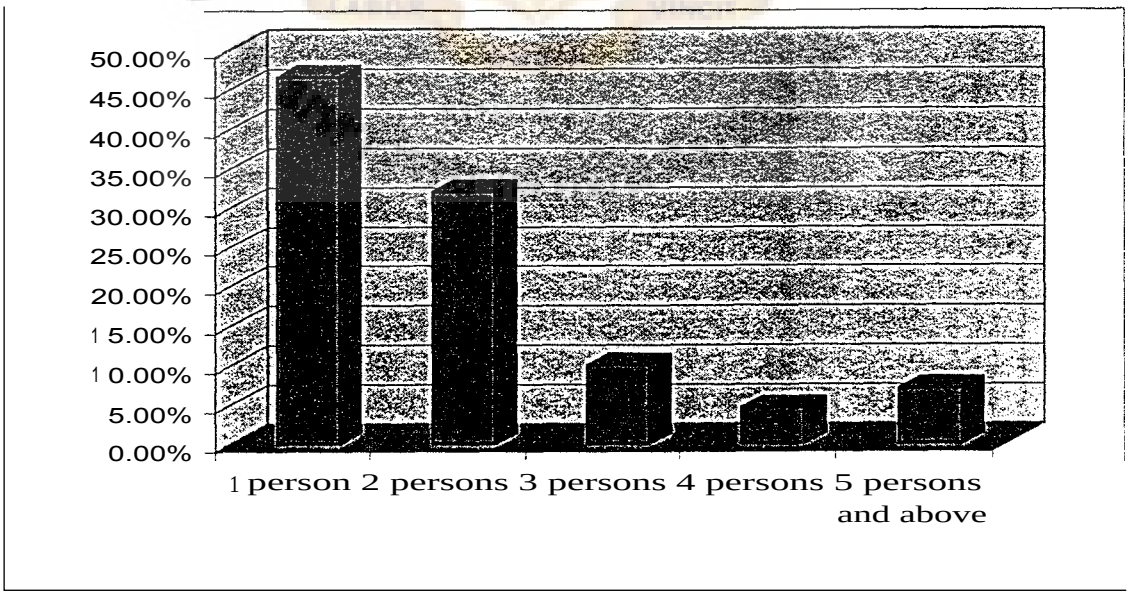

Figure 4.8. Question Number 8 and Its Result.

Question No. 9

9. What period of time do you need to come to ABAC (Huamark Campus)?

❑	9.1	06:30-08:00 AM	a	9.5	12:30-14:00 PM
o	9.2	08:00-09:30 AM	o	9.6	14:00-15:30 PM
o	9.3	09:30-11:00 AM	❑	9.7	15:30-17:00 PM
a	9.4	11:00-12:30 PM	❑	9.8	17:00-18:30 PM

Table 4.9. Result of Question No. 9.

	Frequency	Percentage
6:30-8:00 a.m.	35	17.50%
8.00-9:30 a.m.	56	28.00%
9.30-11:00 a.m.	55	27.50%
11:00-12:30 p.m.	29	14.50%
12:30-14:00 p.m.	8	4.00%
14:00-15:30 p.m.	5	2.50%
15:30-17:00 p.m.	5	2.50%
17:00-18:30 p.m.	7	3.50%
Total	200	100.00%

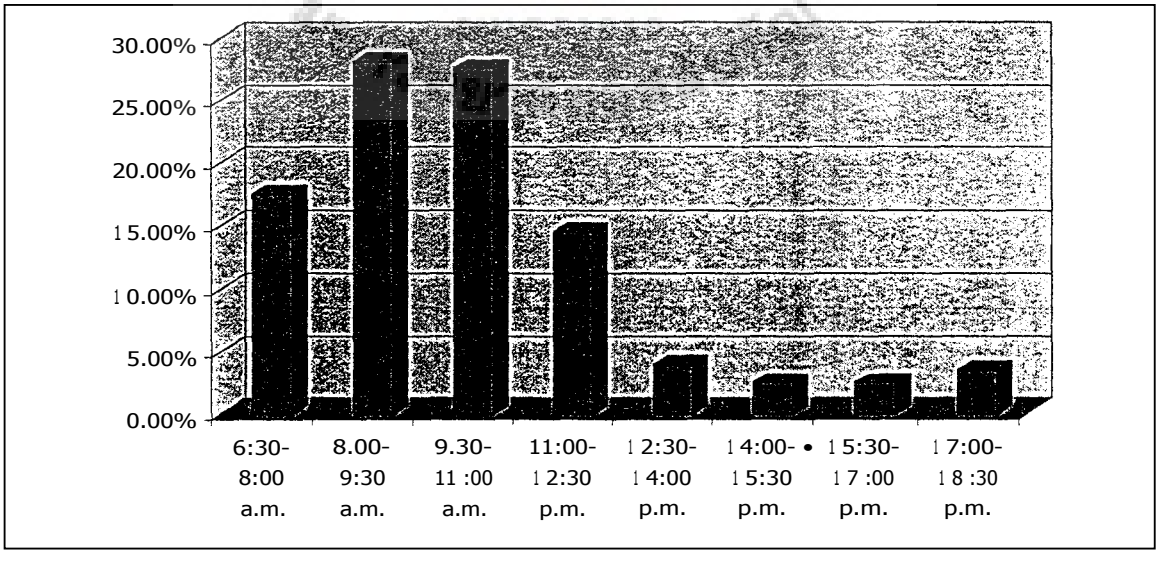

Figure 4.9. Question Number 9 and Its Result.

Question No. 10

10. What period of time do you leave ABAC (Huamark Campus)?

- ❑ 10.1 09:30-11:00 AM
- ❑ 10.2 11:00-12:30 PM
- 10.3 12:30-14:00 PM
- ❑ 10.4 14:00-15:30 PM
- ❑ 10.5 15:30-17:00 PM
- ❑ 10.6 17:00-18:30 PM
- ❑ 10.7 18:30-21:00 PM
- 10.8 After 21:00 PM

Table 4.10. Result of Question No. 10.

	Frequency	Percentage
9.30-11:00 a.m.	9	4.50%
11:00-12:30 p.m.	2	1.00%
12:30-14:00 p.m.	3	1.50%
14:00-15:30 p.m.	13	6.50%
15:30-17:00 p.m.	46	23.00%
17:00-18:30 p.m.	65	32.50%
18:30-21:00 p.m.	47	23.50%
After 21:00 p.m.	15	7.50%
Total	200	100.00%

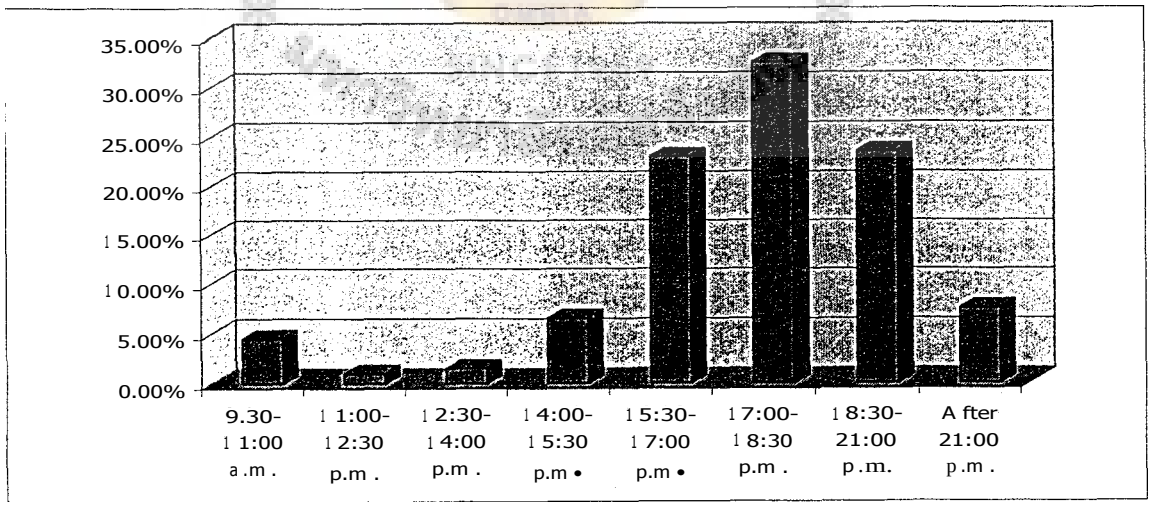

Figure 4.10. Question Number 10 and Its Result.

Question No. 11

11. Which day you usually come to ABAC (Huamark Campus)? (You can select more than 1 choice.)

- ❑ 11.1 Monday
- ❑ 11.2 Tuesday
- ❑ 11.3 Wednesday
- o 11.4 Thursday
- ❑ 11.5 Friday
- ❑ 11.6 Saturday
- ❑ 11.7 Sunday

Table 4.11. Result of Question No. 11.

	Frequency	Percentage
Monday	146	73%
Tuesday	145	73%
Wednesday	146	73%
Thursday	137	69%
Friday	145	73%
Saturday	97	49%
Sunday	28	14%

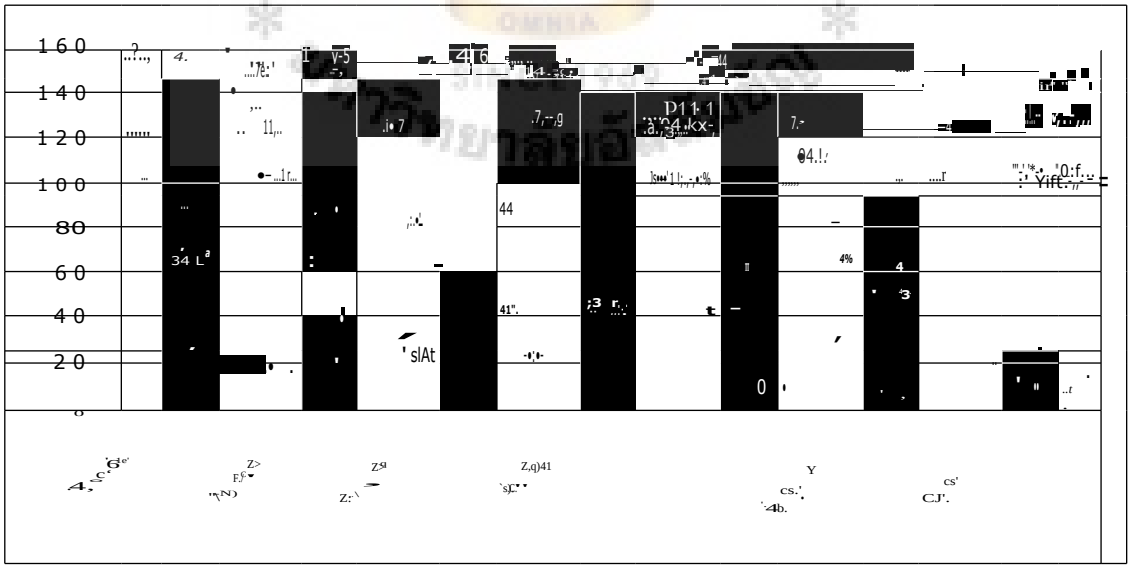

Figure 4.11. Question Number 11 and Its Result.

Result of Personal data

For the commuting type, most respondents are solo drivers or SOV with 45% percentage. The second most type is those who commute to ABAC by friend's car (23.5%). The next is those who drive to ABAC **with** friends (18%). The 2 smallest portions of the respondents are sent home by drivers (7%) and others (6.5%).

For the occupancy of the vehicle, the highest percentage is a one occupancy or 46.5% followed by 2 occupancy (32%), 3 occupancy (10%), more than 4 or 5 occupancy (6.5%), and 4 occupancy (4.5%). The average occupancy of the respondents is 1.935 persons per vehicle.

For the time that respondents usually commute to ABAC, most of them commute to ABAC between 6:30-12.30 (6:30-8:00 =17.5%, 8:01-9:30 =28%, 9:31-11:00 =27.5%and 11:01-13:30 =14.5%) or we can say it is 87.5%.

For the time that respondents leave from ABAC, most respondents leave from ABAC between 15:31-21:00 (15:31-17:00 =23%, 17:01-18:30 =32.5%, and 18:31-21:00 =23.5%) or 79%.

For the day that respondent visits ABAC, the percentage of other ABAC visited days from Monday to Friday, except for Saturday (48.5%), is almost equal (73-68.5%). The percentage of respondents visiting ABAC on Sunday is only 14%.

Question No. 12

12. What is the period of the day do you think traffic is the worst in ABAC (Huamark Campus)?

❑ 12.1 06:30-09:30 AM

o 12.2 09:30-12:30 PM

o 12.3 12:30-15:30 PM

❑ 12.4 15:30-18:30 PM

o 12.5 After 18:30 PM

❑ 12.6 Others, specify_____

Table 4.12. Result of Question No. 12.

	Frequency	Percentage
6:30-9:30 a.m.	40	20.00%
9.30-12:30 a.m.	22	11.00%
12:30-15:30 p.m.	3	1.50%
15:30-18:30 p.m.	100	50.00%
After 18:30 p.m.	33	16.50%
Time after the exam	2	1.00%
Total	200	100.00%

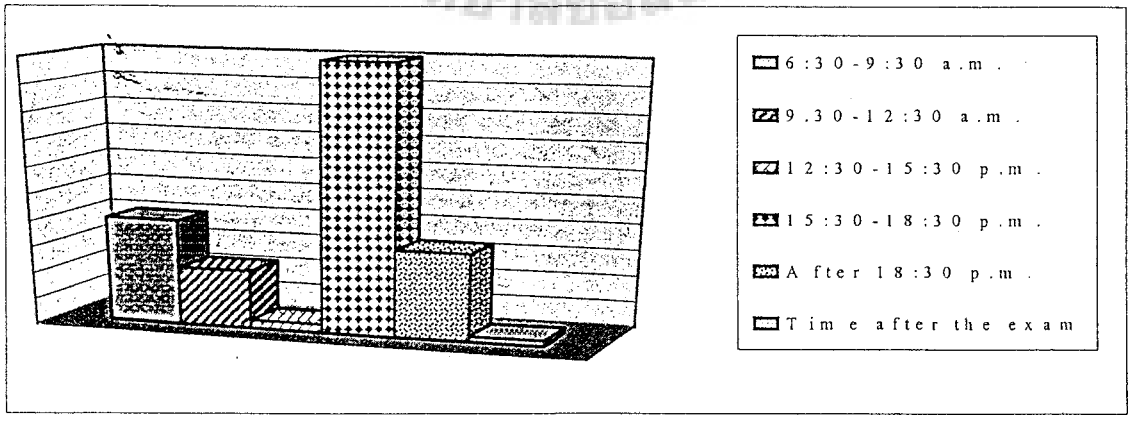

Figure 4.12. Question Number 12 and Its Result.

Question No. 13

13. If you normally drive to ABAC, how do you think about finding a parking lot in ABAC (Huamark Campus)?

- ❑ 13.1 Very difficult
- ❑ 13.2 Difficult
- ❑ 13.3 Normal
- ❑ 13.4 Easy
- ❑ 13.5 Very easy
- ❑ 13.6 Others, specify_____

Table 4.13. Result of Question No. 13.

	Frequency	Percentage
Very Difficult	41	20.50%
Difficult	80	40.00%
Normal	69	34.50%
Easy	8	4.00%
Very Easy	2	1.00%
Total	200	100%

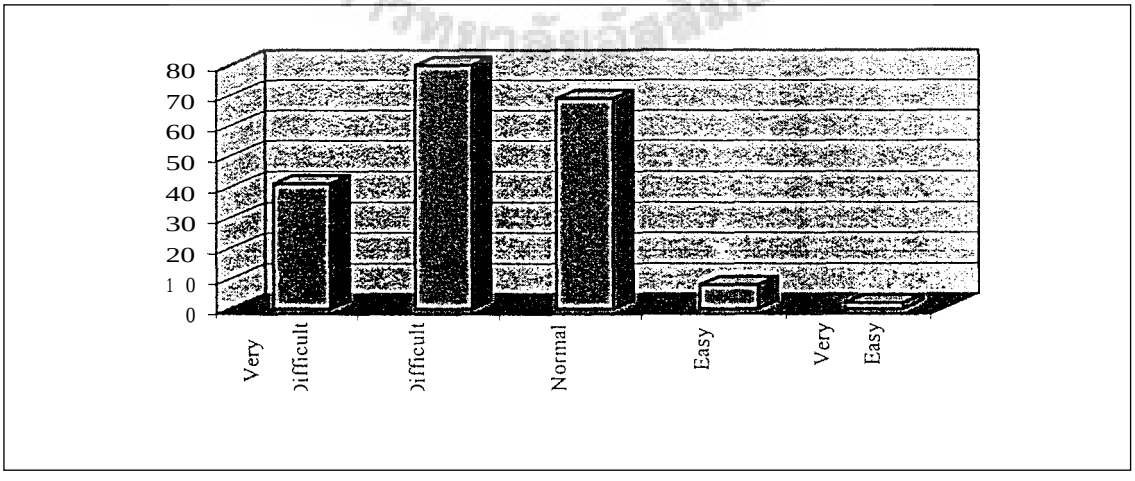

Figure 4.13. Question Number 13 and Its Result.

Question No. 14

14. Usually, how long would you take to find a parking lot?

- ❑ 14.1 Less than 5 minutes
- ❑ 14.2 5-10 minutes
- ❑ 14.3 10-15 minutes
- ❑ 14.4 15-30 minutes
- ❑ 14.5 More than 30 minutes

Table 4.14. Result of Question No. 14.

	Frequency	Percentage
< 5 min.	40	20.00%
5-10 min.	91	45.50%
10-15 min.	55	27.50%
15-30 min.	7	3.50%
> 30 min	7	3.50%
Total	200	100%

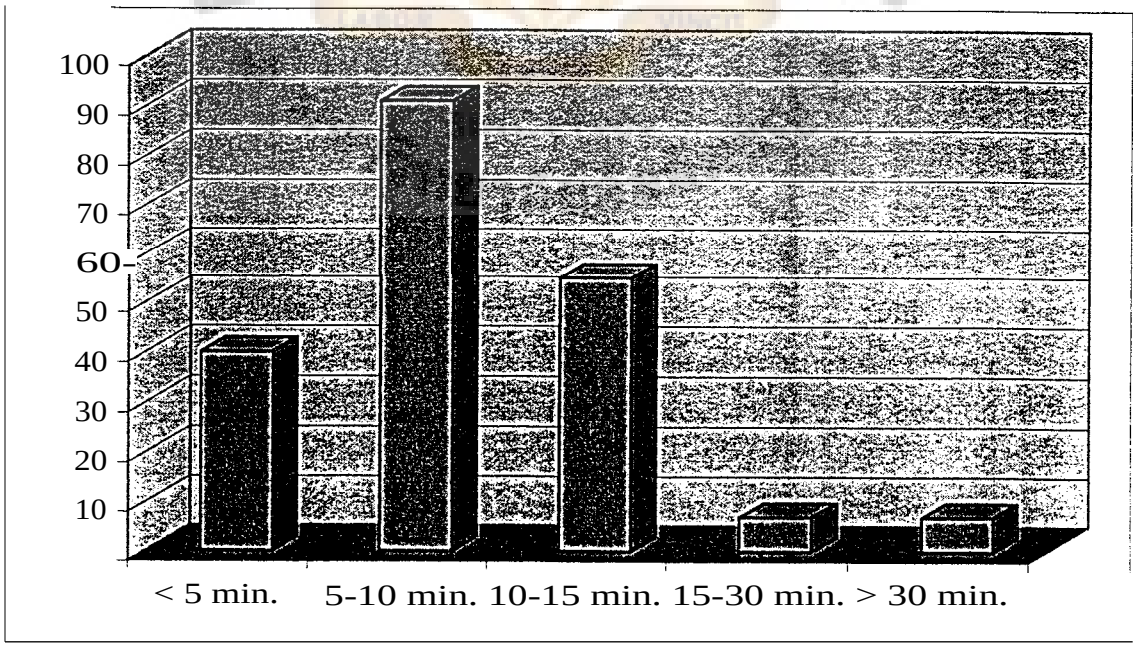

Figure 4.14. Question Number 14 and Its Result.

Question No. 15

15. Where do you park your car when you come to ABAC (Huamark Campus)?

u 15.1 Find available parking space from private parking lot around ABAC

❑ 15.2 Have monthly car park from private parking lot around ABAC

❑ 15.3 Find free car park

❑ 15.4 Find available parking space from ABAC parking lot (Safe Park)

❑ 15.5 Have monthly car park from ABAC parking lot (Safe Park)

❑ 15.6 Others, specify_____

Table 4.15. Result of Question No. 15.

	Frequency	Percentage
Private parking lot	80	40.00%
Private parking lot with monthly payment	24	12.00%
Free parking lot	29	14.50%
AU's parking lot (Safe Park)	50	25.00%
AU's parking lot (Safe Park) with monthly payment	11	5.50%
Others	6	3.00%
Total	200	100%

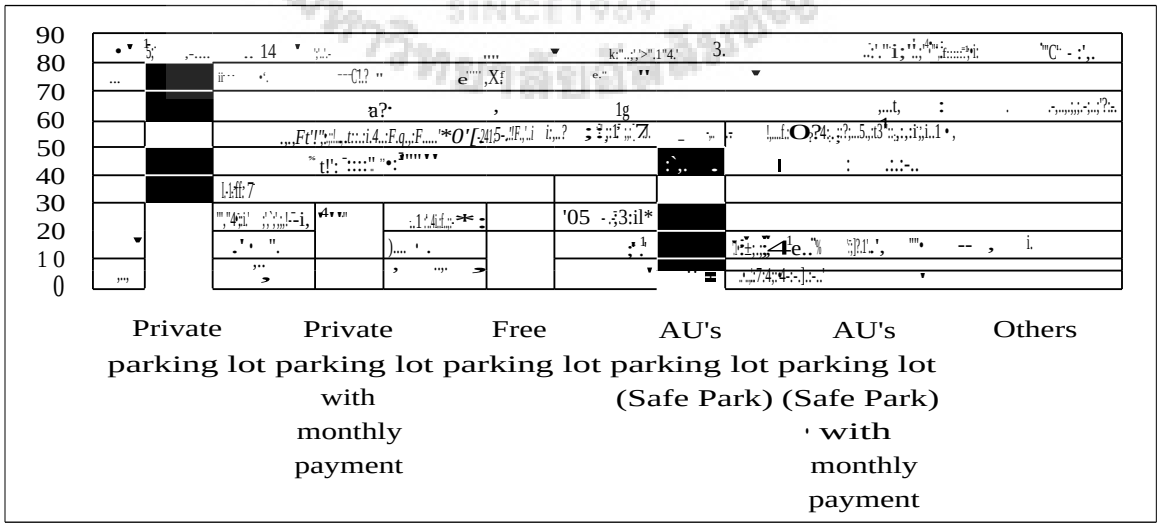

Figure 4.15. Question Number 15 and Its Result.

Question No. 16

16. Do you prefer anyone to company you to come to ABAC (Huamark Campus)?

- ❑ 15.1 Yes
- ❑ 15.2 No

Table 4.16. Result of Question No. 16.

	Frequency	Percentage
Yes	135	67.50%
No	65	32.50%
Total	200	100%

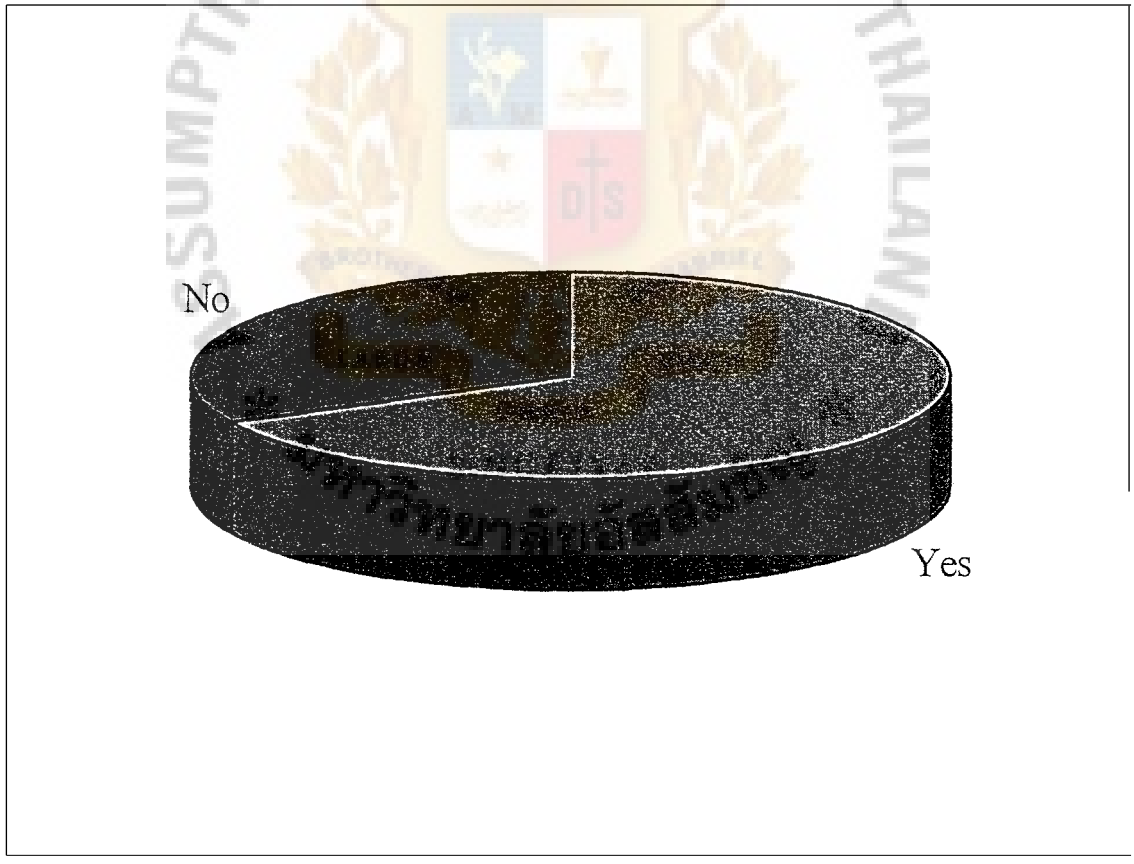

Figure 4.16. Question Number 16 and Its Result.

Question No. 17

17. How do you feel about having the stranger come to ABAC (Huamark Campus) with you in the same car?

- o 17.1 Scare
- o 17.2 Normal
- o 17.3 Safe
- o 17.4 Others, specify_____

Table 4.17. Result of Question No. 17.

	Frequency	Percentage
Scare	91	45.50%
Noinial	90	45.00%
Safe	8	4.00%
Not sure	11	5.50%
Total	200	100%

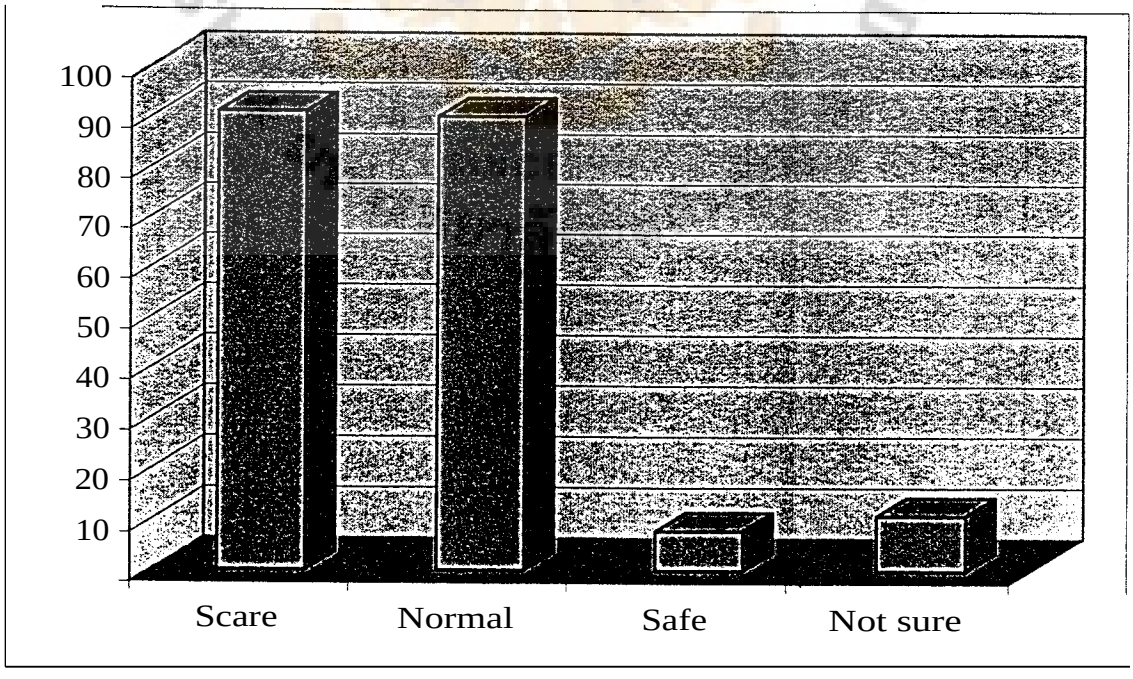

Figure 4.17. Question Number 17 and Its Result.

Question No. 18

18. Do you mind if the stranger that come to ABAC with you is ABAC Students?

- ❑ 18.1 Scare
- ❑ 18.2 Normal
- ❑ 18.3 Safe
- ❑ 18.4 Others, specify_____

Table 4.18. Result of Question No. 18.

	Frequency	Percentage
Scare	50	25.00%
Normal	129	64.50%
Safe	13	6.50%
Not sure	8	4.00%
Total	200	100%

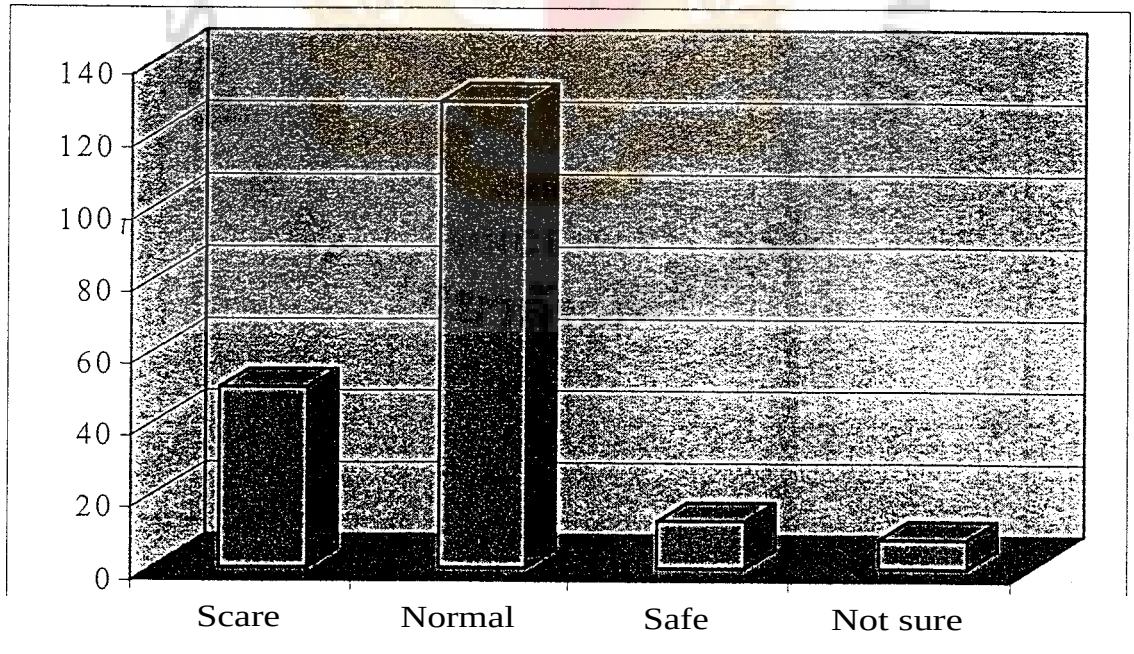

Figure 4.18. Question Number 18 and Its Result.

Question No. 19

19. Will you accept some ABAC student come to ABAC with your in the same car if they will share your fuel expense?

- ❑ 19.1 Accept
- ❑ 19.2 Not accept

Table 4.19. Result of Question No. 19.

	Frequency	Percentage
Accept	133	66.50%
Not accept	67	33.50%
Total	200	100%

Figure 4.19. Question Number 19 and Its Result.

Question No. 20

20. Will you accept some ABAC student come to ABAC with you in the same car if it will reduce traffic problem around ABAC (Huamark Campus)?

o 20.1 Accept

❑ 20.2 Not accept

Table 4.20. Result of Question No. 20.

	Frequency	Percentage
Accept	145	72.50%
Not accept	55	27.50%
Total	200	100%

Figure 4.20. Question Number 20 and Its Result.

Question No. 21

21. Will you accept some ABAC student come to ABAC with your in the same car if parking space will be available for you?

- ❑ 21.1 Accept
- ❑ 21.2 Not accept

Table 4.21. Result of Question No. 21.

	Frequency	Percentage
Accept	142	71.00%
Not accept	58	29.00%
Total	200	100%

Figure 4.21. Question Number 21 and Its Result.

Result of Attitude Data

For the attitude of the respondents toward the worst traffic period in ABAC, most respondents said it was between 15:30-18:30 (50%) while the second worst is the period between 6:30-9:30 (20%), and other is after 18:30 (16.5%)

For the attitude of the respondents toward finding a parking lot in ABAC, most respondents has negative attitudes toward finding a parking space (20.5% very difficult and 40% difficult). The normal attitude of the respondents toward finding a parking space is 34.5%. But for the positive attitude of the respondents toward finding a parking space is only 5%

For the amount of time that respondents spend to find the parking space, 45.5% of the respondents normally spend 5-10 minutes to find the parking lot. 27.5% of the respondents spend 11-15 minutes. Finally, 20% of the respondents spend less than 5 minutes to find the parking lot.

For the payment of the parking fee and the parking spaces that respondents usually select, 40% of the respondents park at private parking lots with daily payment. 25% of the respondents park at ABAC parking lots with daily payment. 14.5% of the respondents will find free parking lots. 12% of the respondents park at the

private parking lots with monthly payment.

67.5% of the respondents prefer anyone to come to ABAC with them. (32.5% does not)

For the attitude of the respondents toward commuting to ABAC with strangers, 45.5% of the respondents feels scared. 45% feels it is normal. In addition, if a stranger is an ABAC student, the respondents who feel scared will reduces to 25% but the respondents who feel normal will increase to 64.5%.

For the attitude toward carpool, 66.5% of the respondents believes carpool is acceptable because if it helps them share the fuel expenses, while 33.5% of respondents rejects.

For the attitude toward carpool, 72.5% of the respondents thinks carpool is acceptable because it helps reduce the traffic problem around ABAC, while 27.5% of respondents rejects.

For the attitude toward carpool, 71% of the respondents accepts it because they think there will be more available parking space, while 29% of respondents rejects it.

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Question No. 22

22. If Carpool Club exit in ABAC, how do you think about these factors on the club?

Please mark (X) one of these scales for each factor.

Factors	Opinion				
	Absolutely Important	Important	Normal	Not important	Absolutely not important
22.01 Officially organized by ABAC					
22.02 Secure for members					
22.03 Supported by ABAC (ex. giving free parking lots for members)					
22.04 Reliable management team					
22.05 Variable route choices					
22.06 Many cars for members to select					
22.07 Qualified members only					
22.08 Low charges for commuters					
22.09 High compensation for driving members					
22.10 Supported by all clubs in ABAC					
22.11 Information support through Internet					

Table 4.22. Result of Question No. 22.

	Frequency					Mean
	Abs. Important 5	Important 4	Normal 3	Not Important 2	Abs. not Important 1	
22 .0 1	54	87	52	6	1	3.935
22.02	83	78	36	3	0	4.2 0 5
22 .0 3	92	75	31	4	0	4.255
22.04	56	90	46	8	0	3.970
22.05	50	84	57	8	1	3.870
22.06	46	76	56	20	2	3.720
22 .0 7	44	84	46	23	3	3.715
22 .0 8	56	78	47	1 8	1	3.850
22.09	27	83	73	1 4	3	3.585
22 .1 0	45	73	66	1 2	4	3.715
22.11	32	84	68	1 4	2	3.650

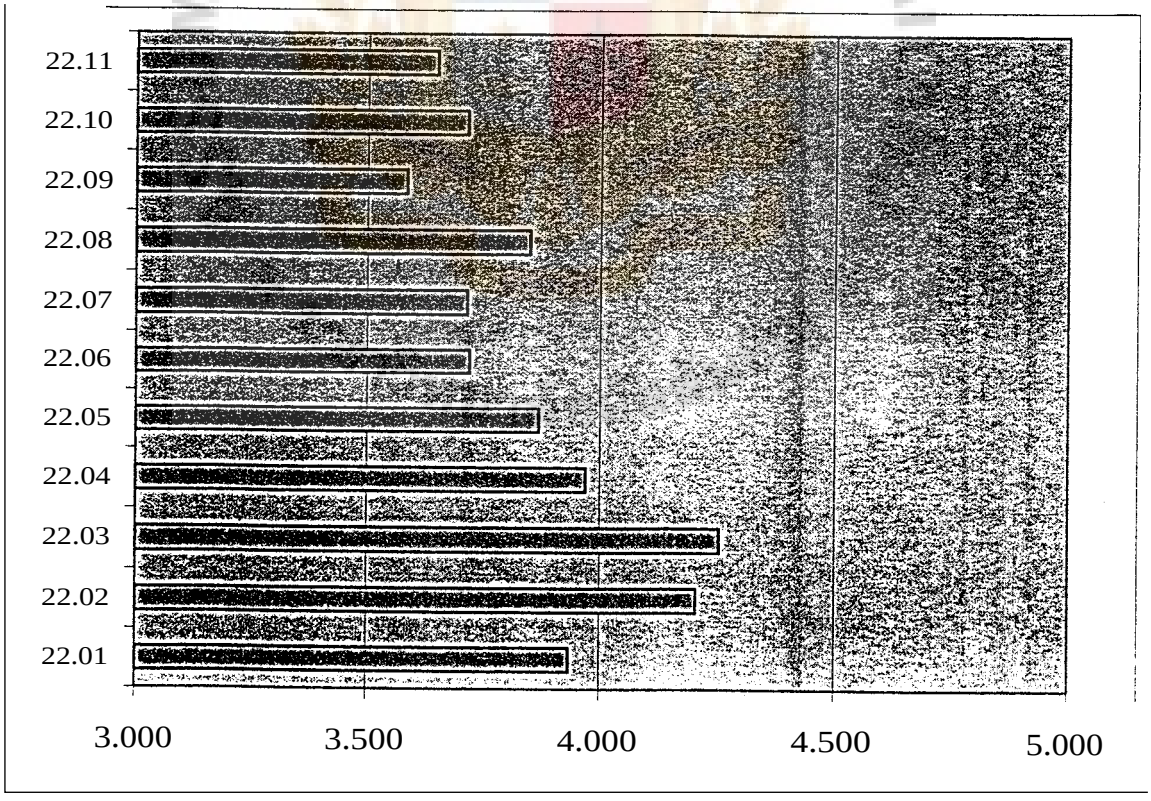

Figure 4.22. Question Number 22 and Its Result.

Question No. 23

23. Which source that you ever heard about Carpool?

❑ 23.1 Parents

❑ 23.2 Friends

❑ 23.3 Instructors

❑ 23.4 Boy/Girlfriends

❑ 23.5 Never heard

❑ 23.6 Other, specify_____

Table 4.23. Result of Question No. 23.

	Frequency	Percentage
Never Heard	72	36.00%
Friends	71	35.50%
Instructures	21	10.50%
Parents	19	9.50%
Boy/Girl Friends	3	1.50%
Others	14	7.00%
Total	200	100.00%

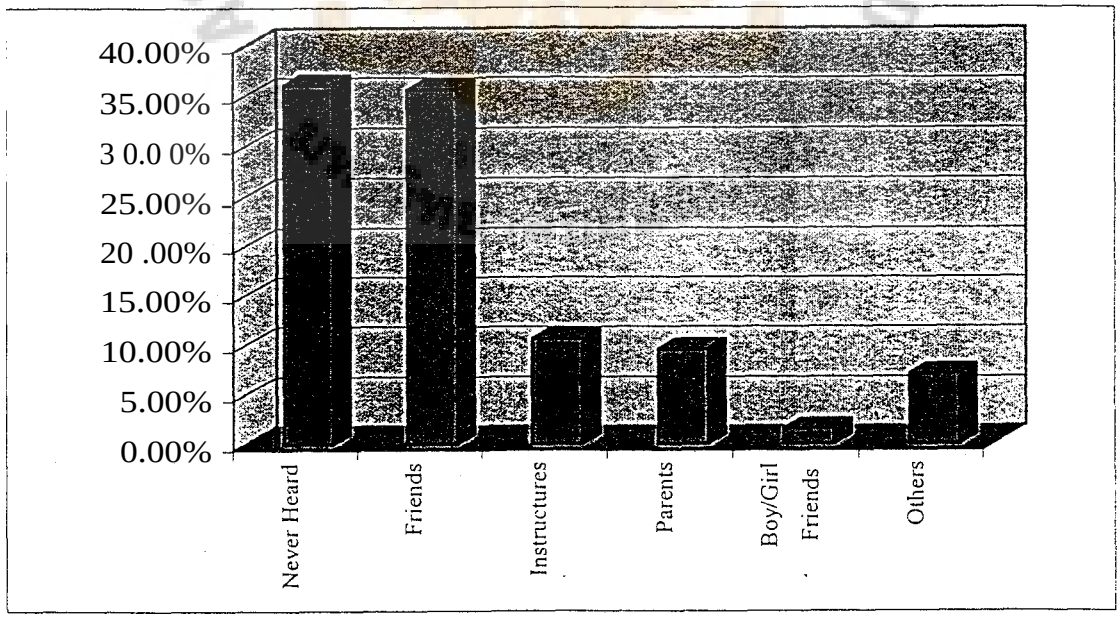

Figure 4.23. Question Number 23 and Its Result.

Question No. 24

24. What do you think is/are advantage(s) of a car pool club? (Can select more than one answer)

o 24.1 Time saving

o 24.2 Economical

o 24.3 Social benefits

o 24.4 Learn to share and sacrifice

o - 24.5 Air pollution reduction

o 24.6 Others, specify_____

Table 4.24. Result of Question No. 24.

	Frequency	Percentage
Time saving	98	49.00%
Economical	100	50.00%
Social benefits	86	43.00%
Learn to share and sacrifice	66	33.00%
Air pollution reduction	89	44.50%
Others	6	3.00%

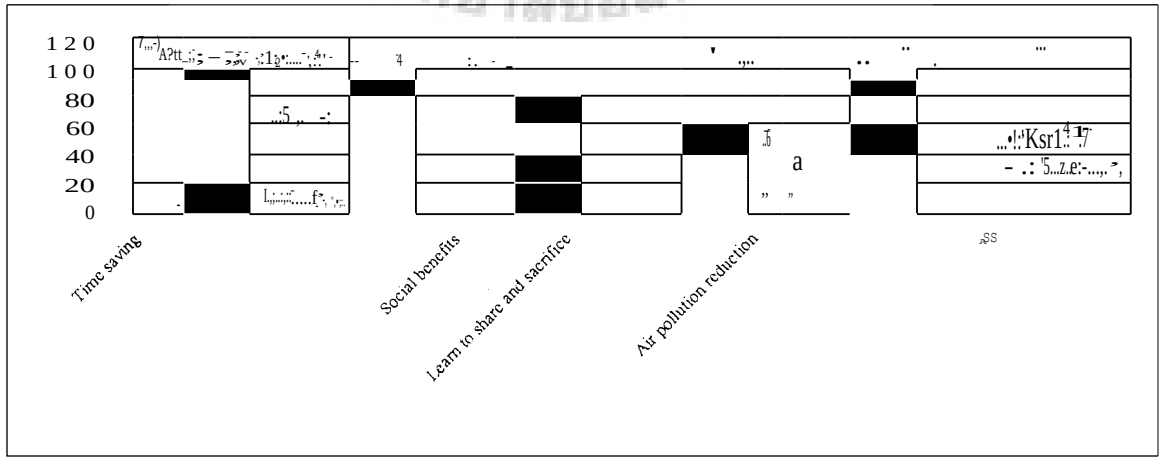

Figure 4.24. Question Number 24 and Its Result.

Question No. 25

25. What do you think is/are disadvantage(s) of a car pool club?

(Can select more than one answer)

o 25.1 Not safe for driving members

❑ 25.2 Not safe for commuting members

o 25.3 Time conflict for driving and commuting members

❑ 25.4 Driving members may not be available everyday

o 25.5 Others, specify_____

Table 4.25. Result of Question No. 25.

	Frequency	Percentage
Not safe for driving members	90	45.00%
Not safe for commuting members	' 50	25.00%
Time conflict for driving and commuting members	88	44.00%
Driving members may not be available everyday	96	48.00%
Others	3	1.50%

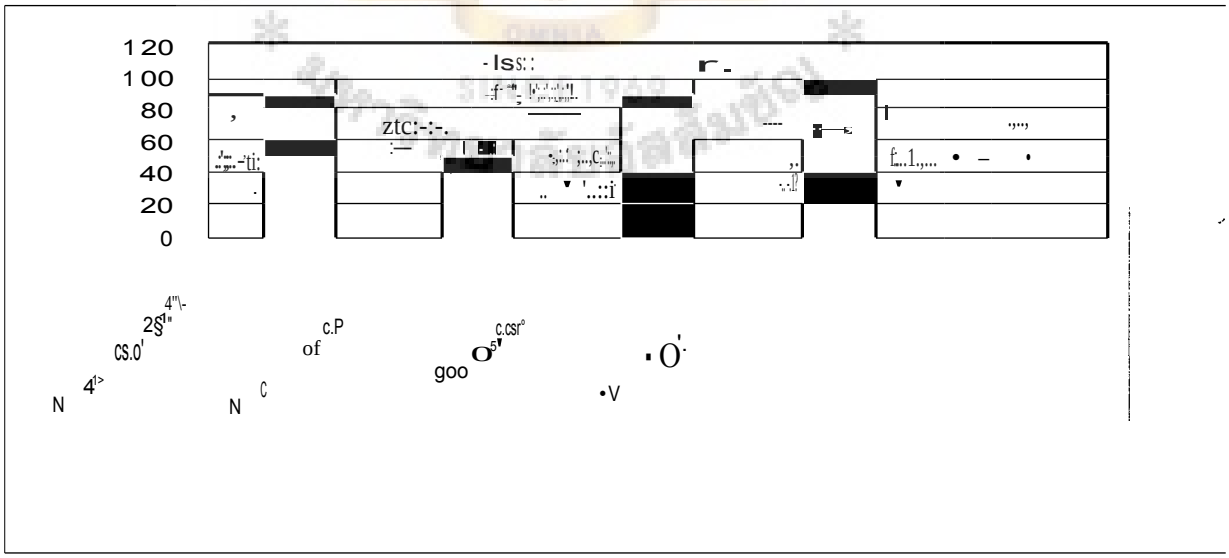

Figure 4.25. Question Number 25 and Its Result.

Question No. 26

26. It is possible to operate Carpool Club in ABAC?

- ❑ 26.1 Possible
- ❑ 26.2 Impossible

Table 4.26. Result of Question No. 26.

	Frequency	Percentage
Possible	113	56.50%
Impossible	87	43.50%
Total	200	100%

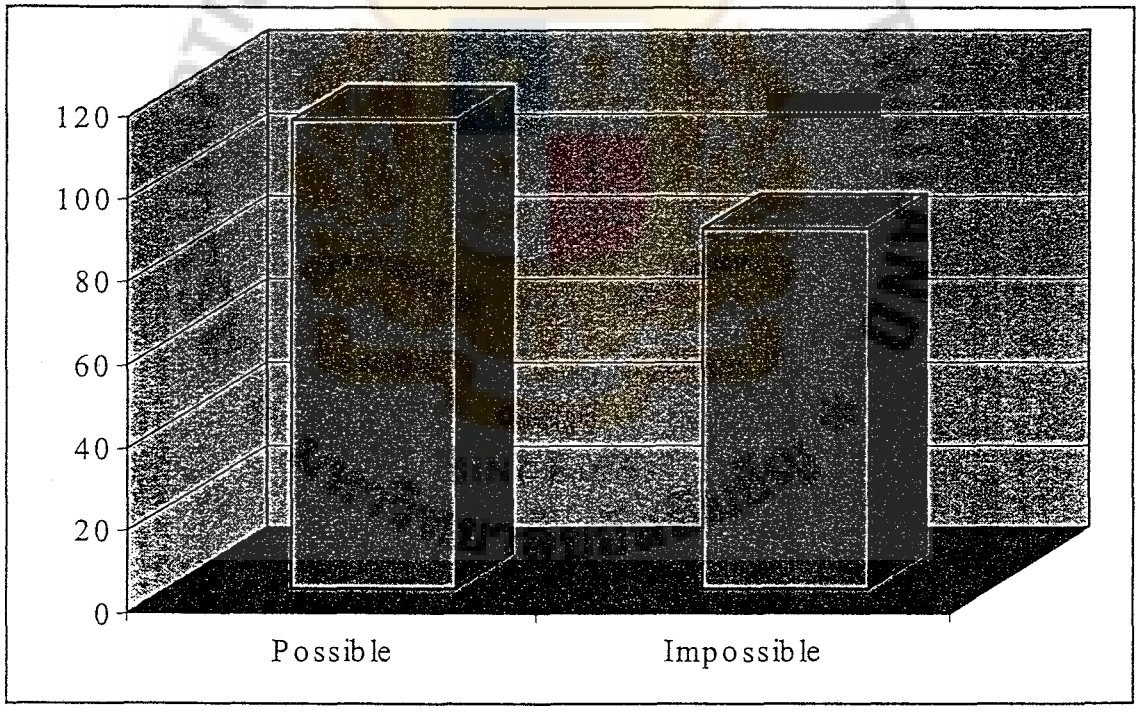

Figure 4.26. Question Number 26 and Its Result.

Question No. 27

27. It is possible to operate Carpool Club in ABAC?

a 27.1 Possible

❑ 27.2 Impossible

❑ 27.3 Others, specify_____

Table 4.27. Result of Question No. 27.

	Frequency	Percentage
Join	86	43.00%
Not Sure	30	15.00%
Not Join	84	42.00%
Total	200	100%

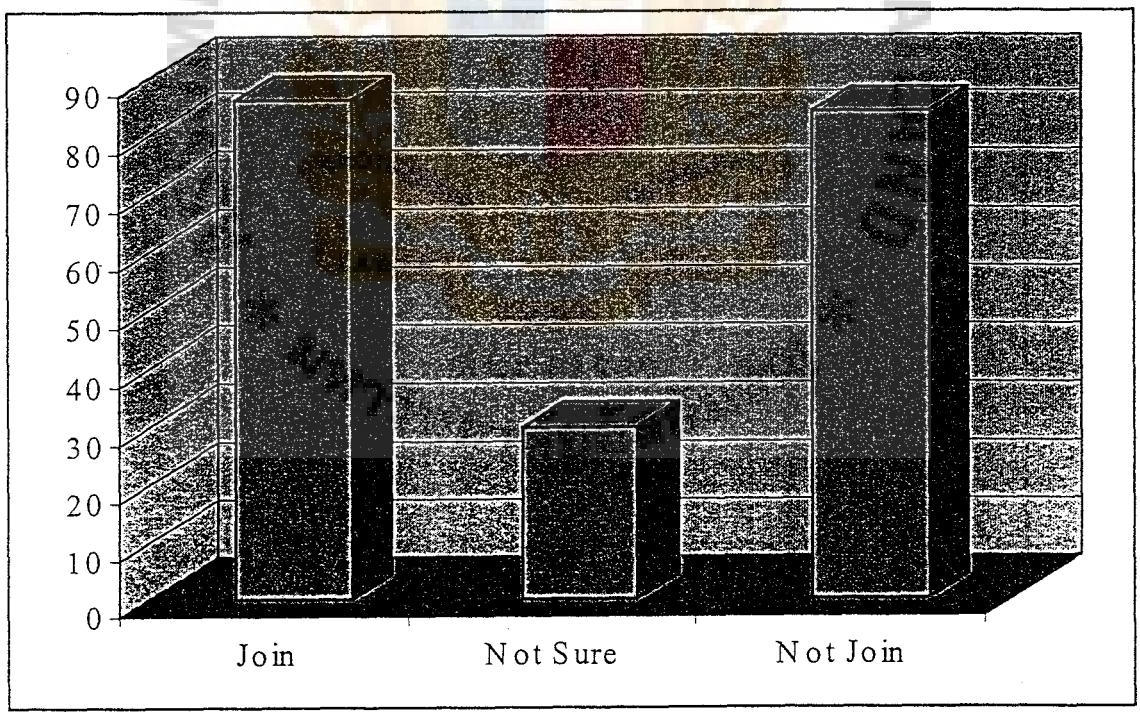

Figure 4.27. Question Number 27 and Its Result.

Result of Preference Data.

For the factors of the Carpool Club that the respondents prefer, all factors are preferred at almost closed rate (3.725-4.255), where 3 means normal, 4 means important and 5 means absolute important). However, the top two of the factors are security for the members and being supported by ABAC.

For the sources about carpool that respondents have ever heard, 64% of the respondents have ever heard about carpool (From friend 35%, instructors 10.5%, parents 9.5%) while, 36% of the respondents have never heard about carpool.

For the advantages of Carpool Club, All advantages are ranked at almost equal rate, except learning to share and sacrifice which has a little lower rate.

For the disadvantages of the Carpool Club, All disadvantages are ranked at almost equal rate, except not safe for the passengers which has a little lower rate.

For the possibility of Carpool club in ABAC, 56.5% of the respondents says it is possible while 43.5% says not possible.

For the decision of the respondents to join Carpool club, 53% of the respondents will join the club, 15% of the respondents is not sure while, and 42% will not join.

4.3 Research Finding

(1) From the total sample size of 200, the questionnaires had been equally distributed to both male and female respondents, that is 50:50 ratio (100 male respondents and 100 female respondents).

(2) As the questionnaires were distributed to 200 respondents, 51.5% of them are 18-20 years old, 39.5% are older than 20 years old, and 9% are under 18.

(3) For the question asking how much the respondents earn monthly, we found that 57% of respondents earns 5001-10000 bahts a month, 30.5% earns less than 5000 a month, 9.5% earns 10001-15000, 2.5% earns 15001-20000, and 0.5% earns more than 20000 bahts a month.

(4) From the survey, it is found that most respondents receive their monthly income from parents (96.5%), 2.5% earns from their own working, and other 1% earns from cousins.

(5) The findings show that most respondents (52%) are from BBA, 12.5% from Art, 10% from Engineering, 7.5% from Science, 7% from Law, 4.5% from Risk Management, 2% from Nursing, and others are from Communication Art, Architect, Biotechnology in equal proportions (1.5%).

(6) The questionnaires had been equally distributed to respondents who are studying in 1st to 4th academic year. That is 25% for each academic year.

(7) From the survey on how respondents usually commute to Huamark ABAC, the findings show that 45% of respondents usually drive alone, 23.5% comes by friend's car, 18% drives with friends, 7% was sent by home car driver, and 6.5% commutes by other means.

(8) From the question no. 8, asking how many passengers usually commute with the respondents (including themselves), it is found that most

respondents with a total percentage of 46.5 usually commutes alone, while 32% commutes with one other passenger, 10% commutes with 2 other passengers, 4.5% commutes with 3 passengers, and 7% of them commutes with 4 or more passengers. Average number of passenger per car is 1.935 persons.

(9) From question no. 9, it is found that most respondents come to ABAC around 8.00-9.30 a.m. (28%) and 9.30-11.00 a.m. (27.5%), while others come around 6.30-8.00 a.m. (17.5%), 11.00 a.m.-12.30 p.m. (14.5%), 12.30-14.00 p.m. (4%), 17.00-18.30 p.m. (3.5%), 14.00-15.30 p.m. (2.5%), and 15.30-17.00 p.m. (2.5%). Most ABAC students come to Huamark Campus before 12:30 p.m.

(10) We found that most respondents usually leave ABAC around 17.00-18.30 p.m. (32.5%), 18.30-21.00 p.m. (23.5%), and 15.30-17.00 p.m. (23%) Most ABAC students leave Huamark Campus after 15:30 p.m.

(11) From the question number 11, Which day you usually come to ABAC (Huamark Campus)?, 73 percentages of the respondent come to ABAC on Monday. 73 percentages of the respondent come to ABAC on Tuesday. 73 percentages of the respondent come to ABAC on Wednesday. 69 percentages of the respondent come to ABAC on Thursday. 73 percentages of the respondent come to ABAC on Friday. 49 percentages of the respondent come to ABAC on Saturday. And 14 percentages of the respondent come to ABAC on Sunday. Most respondents come to ABAC on Monday to Friday.

(12) The findings show that most respondents think that the traffic around ABAC is the worst around 15.30-18.30 p.m. (50%), 6.30-8.30 a.m. (20%), and 9.30 a.m.-12.30 p.m. (11%). Less respondents gave their vote to 12.30-15.30 p.m. (1.5%). Very few said the time after the exams (1%).

(13) For the question asking how respondents think about finding a parking lot in ABAC, most respondents (40%) say difficult, 34.5% says normal, 20.5% says very difficult, and very few says easy (4%) and very easy (1%).

(14) Asking how long respondents usually take to find a parking space, we found that most of them take 5-10 minutes (45.5%), 27.5% takes 11-15 minutes, 20% takes less than 5 minutes, 3.5% takes 16-30 minutes, and 3.5% takes more than 30 minutes. Average time that the respondent used to find parking space is 10 minutes.

(15) From the question no. 15, it is found that most respondents (40%) find available parking space from private parking lots around ABAC. 25% finds available car park in ABAC parking lot, 14.5% tries to find free parking lot, 12% parks in private parking lots paying monthly fee, 5.5% parks in ABAC parking lot paying monthly fees, and 3% chooses others.

(16) Asking whether respondents prefer anyone to accompany them to come to ABAC, we found that most of them said yes (67.5%) and few of them said no (32.5%).

(17) We found from question no. 17 that the percentages of the respondents who are scared and passive about having strangers in the same car are almost equal, 45.5% and 45%, whereas, few of them think that it is safe or even not sure about the safety of having strangers in the same cars.

(18) In question no. 18 asking if the respondents mind if the strangers accompany them to ABAC are ABAC students, most respondents feel passive (64.5%). However, 25% is those who are scared and few of them feel safe (6.5%) and uncertain (4%).

(19) If fuel expenses are shared, most respondents feel it is acceptable for them to let other ABAC students to company them in the same car, with the percentage of 66.5%. However, 33.5% still deny.

(20) From the finding in question no. 20, it is shown that most respondents accept that sharing cars among ABAC students will reduce traffic problems around Huamark Campus ABAC (72.5%). Still, other 27.5% said they thought not.

(21) From question no. 21, most respondents (71%) accept that coming to ABAC in the same car with other ABAC students will positively affect the availability of parking spaces around Huamark Campus ABAC.

(22) From the question 22, the opinion of the respondents toward factors important of Carpool Club, scores are given from 1-5 while 1 mean absolutely not important, 2 mean not important, 3 mean normal, 4 mean important and 5 mean absolutely important. The highest score are Supported from ABAC (4.255) and Secure for members (4.205). and following with Reliable management team (3.970), Officially organized by ABAC (3.935), Variable route choice (3.870), Low charge for commuters (3.850), Many cars for the members to select (3.720), Qualify member only (3.715), Supported by all club in ABAC (3.715), Information support through internet (3.650), and High compensation for driving member.

(23) Asking about the source of carpool information respondents have heard about, 36% has never heard about carpool at all, 35.5% heard from friends, 10.5% heard from instructors, 9.5% from parents, 1.5% from boyfriends or girlfriends, and the remaining 7% heard from other sources of information.

(24) From the question no. 24, the advantage of Carpool Club for the respondents. 50% answer Economical, 49% answer Time saving, 44.5% answer Air pollution reduction, 43% answer Social benefit, 33% answer learn to share and sacrifice, and 3% answer the others.

(25) From the question no. 25, the disadvantage of Carpool Club for the respondents. 48% worry about driving member may not be available everyday, 45% worry about the safety of the driving member, 44% worry about time conflict for driving and commuting members, 25% worry about the safety of the commuting members, and 1.5% worry about others.

(26) Question no. 26 asks about the respondents' opinion on the possibility of having a Carpool Club in ABAC. From the survey we found that 56.5% of the respondents feels that it is possible and almost half of them (43.5%) thinks that it is impossible.

(27) From the last question asking the respondents on their willingness to join a Carpool Club if available, we found that 43% of the respondents is willing to join, while 42% refuses to join. Other 15% still feel unsure.

(a) The reasons that make the respondents join the Carpool Club are given as follows:

(1) 27 respondents give no reasons.

(2) 17 respondents say it saves money.

(3) 42 respondents give other reasons.

(b) The reasons of not joining the Carpool Club are given as follows:

(1) 35 respondents give no reasons.

(2) 14 respondents say it is not safe.

(3) 35 respondents give other reasons.

(c) The reasons of the respondent who give other answers than joining or not joining the Carpool Club are given as follow

(1) 21 respondents say they may join

(2) 5 respondents say they have no idea.

(3) 4 respondents give other reasons.

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4.4 Answer to the Statement of Problems

From the beginning of the project, the researcher has the statement of the problems for this project. Now the data are collected enough to answer those statement of problems. The problem are answered in descriptive form combined with a table to support the information in detail. The answer of the statement of problem is:

4.4.1 Do ABAC students in different academic years have different behaviors in commute to ABAC?

Researcher divides the behavior in coming to ABAC in many types and asking to the respondent in the questionnaire. There are tables showing the result in detail.

Table 4.28 Question Number 7 Split by Academic Years.

	Academic Years								Total
	1st Year		2nd Year		3rd Year		4th Year		
	Freq	(%)	Freq	(%)	Freq	(%)	Freq	(%)	
Drive alone	26	52%	25	50%	16	32%	23	46%	90
Drive with friend	4	8%	9	18%	11	22%	12	24%	36
Sent by home car	2	4%	6	12%	4	8%	2	4%	14
By friend car	14	28%	9	18%	13	26%	11	22%	47
Others	4	8%	1	2%	6	12%	2	4%	13
Total	50	100%	50	100%	50	100%	50	100%	200

Table 4.29. Question Number 8 Split by Academic Years.

	Academic Years								Total
	1st Year		2nd Year		3rd Year		4th Year		
	Freq	(%)	Freq	(%)	Freq	(%)	Freq	(%)	
1 person	26	52%	25	50%	20	40%	27	54%	98
2 persons	15	30%	17	34%	13	26%	14	28%	59
3 persons	4	8%	6	12%	7	14%	3	6%	20
4 persons	3	6%	1	2%	3	6%	2	4%	9
>4 persons	2	4%	1	2%	7	14%	4	8%	14
Total	50	100%	50	100%	50	100%	50	100%	200

Table 4.30. Question Number 9 Split by Academic Years.

	II cadem is Y ears								Total
	1st Y ear		2nd Y ear		3rd Y ear		4th Y ear		
	F req	V.)	F req	(%)	F req	(%)	Freq	1%)	
6 :30-8 *:00*	7	14%	10	20%	10	20%	8	16%	35
8 :01-9 :30	14	28%	15	30%	11	22%	16	32%	56
9 :31-11 *:00*	17	34%	19	38%	13	26%	6	12%	55
11 :01-12 :30	9	18%	3	6%	9	18%	8	16%	29
12 :31-14 *:00*	0	0%	1	2%	2	4%	5	10%	8
14 :01-15 :30	0	0%	0	0%	1	2%	4	8%	5
15 :31-17 *:00*	1	2%	2	4%	0	0%	2	4%	5
17 :01-18 *:00*	2	4%	0	0%	4	8%	1	2%	7
Total	50	100%	50	100%	50	100%	50	100%	200

Table 4.31 Question Number 10 Split by Academic Years.

	Academic Years								Total
	1st Year		2nd Year		3rd Year		4th Year		
	Freq	(%)	Freq	(%)	Freq	(%)	Freq	(%)	
9:31-11:00	2	4%	1	2%	5	10%	1	2%	9
11:01-12:30	1	2%	1	2%	0	0%	0	0%	2
12:31-14:00	0	0%	0	0%	0	0%	3	6%	3
14:01-15:30	4	8%	4	8%	3	6%	2	4%	13
15:31-17:00	8	16%	12	24%	12	24%	14	28%	46
17:01-18:00	19	38%	18	36%	15	30%	13	26%	65
18:31-21:00	13	26%	10	20%	12	24%	12	24%	47
After 21:00	3	6%	4	8%	3	6%	5	10%	15
Total	50	100%	50	100%	50	100%	50	100%	200

Table 4.28 shows the result of the question number 7 in the questionnaire split by academic year. From table 01, the behaviors of the respondent in each academic year are close. Most of the students in each academic year usually drive to ABAC alone.

Table 4.29 shows the result of the question number 8 in the questionnaire split by academic year. From the table 02, the result of table 02 is related to table 01. Most students drive alone, so that most of them will have only 1 passenger in their vehicle. However, average passenger per vehicle for each academic year is around 1.8.

Table 4.30 shows is the period of time those ABAC students usually come to ABAC split by academic year. It is obvious that each academic year select period of time differently. However, if we group the choices together, we will see that ABAC students in every academic year come to ABAC on 6:30-12:30

Table 4.31 is showing the period of time that ABAC students usually leave ABAC split by academic year. The result of this table is the same as the previous one.

Therefore, we can conclude that ABAC students in different academic years have the same behavior in commuting to ABAC.

4.4.2 Do ABAC students in different genders have different attitudes toward Carpool Club?

Table 4.32 Question Number 19 Split by Gender.

	G ender		Total
	M ale	Fem ale	
Accept	71	62	133
Reject	29	38	67
Total	1 00	100	200

Table 4.33 Question Number 20 Split by Gender.

	G ender		Total
	M ale	Fem ale	
Accept	73	72	1 45
Reject	27	28	55
Total	1 00	1 00	200

Table 4.34 Question Number 21 Split by Gender.

	G ender		Total
	M ale	Fem ale	
Accept	74	68	142
Reject	26	32	58
Total	100	1 00	200

Table 4.35 Question Number 26 Split by Gender.

	Gender		Total
	M ale	Fern ale	
Possible	60	53	1 1 3
Ɛm possible	40	47	87
Total	1 0 0	1 0 0	200

Table 4.36 Question Number 27 Split by Gender.

	G ender		Total
	M ale	Fein ale	
Yes	47	39	86
N o	36	48	84
Others	17	13	30
Total	1 0 0	1 0 0	200

Table 4.32 is a result of question number 19 split by gender. It the attitude of ABAC students toward ridesharing exchange for fuel sharing. The result of Male that accepts ABAC students coming to ABAC with them if they will share the fuel expense is 71% while female is 62%. Only a few different is seem.

Table 4.33 is a result of question number 20 split by gender. It is the attitude of ABAC students toward ridesharing exchange to reduce traffic problems. The percentage difference between male and female is only 1%. It can be concluded that no difference between male and female is in the result.

Table 4.34 is a result of question number 21 split by gender. It is the attitude of ABAC students toward ridesharing exchange for parking space. Male accepts

ridesharing by 74% while female is 68%. Majorities of both groups are accepting ridesharing exchange for parking space.

Table 4.35 a result of question number 26 split by gender. It is the attitude of ABAC student toward existing Carpool Club. Male thinks that operating Carpool Club in ABAC is possible 60% while female is 53%. The percentage difference is 7%, so there are no difference between male and female.

Table 4.36 is a result of question number 27 split by gender this table shows the attitude of ABAC student toward joining Carpool Club.47% of male join Carpool Club, 36% is not join while 17% is not sure. For female 39% is joining the Carpool Club, 48% not joining while 13% is not sure. If we judge from this data only, male and female will have different attitudes toward joining Carpool Club. However the result that respondents have given in open-ended question is show that the respondents who select No or Others need more information or they want to judge after the Carpool Club existed.

Therefore, we can conclude that there are no difference in attitudes toward Carpool Club for different gender.

4.4.3 Do ABAC students in different academic years have different attitudes toward Carpool Club?

Table 4.37 Question Number 19 Split by Academic Years.

	Academic Years								Total
	1st Year		2nd Year		3rd Year		4th Year		
	Freq	(%)	Freq	(%)	Freq	(%)	Freq	(%)	
Accept	35	70%	31	62%	35	70%	32	64%	133
Reject	15	30%	19	38%	15	30%	18	36%	67
Total	50	100%	50	100%	50	100%	50	100%	200

Table 4.38 Question Number 20 Split by Academic Years.

	Academic Years								Total
	1st Year		2nd Year		3rd Year		4th Year		
	Freq	(%)	Freq	(%)	Freq	(%)	Freq	(%)	
Accept	34	68%	33	66%	42	84%	36	72%	145
Reject	16	32%	17	34%	8	16%	14	28%	55
Total	50	100%	50	100%	50	100%	50	100%	200

Table 4.39 Question Number 21 Split by Academic Years.

	Academic Years								Total
	1st Year		2nd Year		3rd Year		4th Year		
	Freq	(%)	Freq	(%)	Freq	(%)	Freq	(%)	
Accept	32	64%	35	70%	39	78%	36	72%	142
Reject	18	36%	15	30%	11	22%	14	28%	58
Total	50	100%	50	100%	50	100%	50	100%	200

Table 4.40 Question Number 26 Split by Academic Years.

	Academic Years								Total
	1st Year		2nd Year		3rd Year		4th Year		
	Freq	(%)	Freq	(%)	Freq	(%)	Freq	(%)	
Possible	30	60%	26	52%	28	56%	29	58%	113
Impossible	20	40%	24	48%	22	44%	21	42%	87
Total	50	100%	50	100%	50	100%	50	100%	200

Table 4.41 Question Number 27 Split by Academic Years.

	Academic Years								Total
	1st Year		2nd Year		3rd Year		4th Year		
	Freq	*(%)*	Freq	*(%)*	Freq	*(%)*	Freq	*(%)*	
Yes	24	48%	22	44%	24	48%	16	32%	86
No	19	38%	22	44%	22	44%	21	42%	84
Others	7	14%	6	12%	4	8%	13	26%	30
Total	50	100%	50	100%	50	100%	50	100%	200

Table 4.37 is the result of question number 19 split by academic year. It is the attitude of ABAC students toward ridesharing exchange for fuel sharing. The result of Males that accepts ABAC student come to ABAC with them if they will share the fuel expense is 71% while female is 62%. Only a few difference occurred.

Table 4.38 is the result of question number 20 split by academic year. It is the attitude of ABAC students toward ridesharing exchange to reduce traffic problem. In this case, majorities of all academic years accept Carpool with the minimum percentage difference of 32%.

Table 4.39 is a result of question number 20 split by academic year. It is the attitude of ABAC students toward ridesharing exchange for the available of parking space. The result of this question is the same as the previous one. The majority of all academic years accept the Carpool with the minimum percentage different of 28%.

Table 4.40 is a result of question number 26 split by academic year. It is the attitude of ABAC students toward existing of Carpool Club in ABAC. Most of the academic years believe that establishing Carpool Club in ABAC is possible with high margin. Only in 2nd year has low margin (4%). However, all academic years believe that establishing Carpool Club in ABAC is possible.

Table 4.41 is a result of question number 27 split by academic year. It is the preference of ABAC students toward Carpool Club in ABAC. All academic years have a few or no different preference between join or not join Carpool Club. Some of the respondents want to get more information before making decision or making decision after Carpool Club existed.

Therefore, we can conclude that ABAC students in different academic years have no different attitudes toward Carpool Club. However, students in 3rd year have a little better attitude toward Carpool Club than the other academic years.

4.4.4Do ABAC students in different genders have different attitude and behaviors toward parking around ABAC?

Table 4.42 Question Number 13 Split by Gender.

	Gender		Total
	Male	Female	
Very difficult	20	21	41
Difficult	36	44	80
Normal	37	32	69
Easy	6	2	8
Very easy	1	1	2
Total	100	100	200

Table 4.43 Question Number 14 Split by Gender.

	Gender		Total
	Male	Female	
< 5 mins	25	15	40
5 - 10 mins	43	48	91
11 - 15 mins	26	29	55
16 - 30 mins	2	5	7
> 30 mins	4	3	7
Total	100	100	200

Table 4.44 Question Number 15 Split by Gender.

	Gender		Total
	Male	Female	
Parking at private parking lot around AU	35	45	80
Pay monthly car park at private parking lot around AU	13	11	24
Parking at free car park	19	10	29
Parking at AU parking lot (Safe Park)	26	24	50
Pay monthly car park at AU parking lot (Safe Park)	4	7	11
Others	3	3	6
Total	100	100	200

Table 4.42 is a result of question Number 13 split by gender. It is the attitude of ABAC student towards finding an available parking space. The result of this table shows that ABAC student in both genders have a same attitude toward finding a parking space. If we assign Number 1 to very easy, 2 to easy, 3 to normal, 4 to difficult, and 5 to very difficult, the average score for male and female are 3.68 and 3.82 respectively.

Table 4.43 is a result of question number 14 split by gender. It is the average times that ABAC student finds an available parking space. The result of this table shows that most of both genders spend 5-10 minutes to find a parking space.

Table 4.44 is a result of question number 15 split by gender. It is the parking behavior of ABAC students. The pattern of both genders is the same, but female prefer to park their cars at private parking lots more than males while male prefer to park their cars at free car park more that females. However the conclusion of this table is both genders have the same parking behavior.

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V. CONCLUSIONS AND RECOMMENDATIONS

5.1 Research Summary

The research of Carpool Club is coming to the last chapter. This research aims to survey the behavior of ABAC students on how they commute to ABAC, to investigate attitude of ABAC students toward Carpool Club, to search influence factors on the success of Carpool Club, to utilize the research information to establish the Carpool Club that is suitable for ABAC students and finally to reduce the traffic problems in ABAC. After data collection and analysis, the researcher has concluded the findings as follows:

(a) Most of the respondents drive to ABAC alone (45%). That means most of vehicle around ABAC is single occupancy vehicle (SOV). Therefore Carpool Club, which turns SOV to high occupancy vehicle (HOV), is possible.

(b) Amount of vehicle around ABAC is high between 8:00-21:00 due to coming and leaving of ABAC students. There is no traffic jam only on Sunday because few students are study on Sunday.

(c) Finding parking space around ABAC is difficult because geographical limitation and some parking space are reserved for faculty members, guess, special events, etc. Students spend an average of 10 minutes to find parking space.

(d) ABAC students are accept concept of Carpool by accepting others ABAC students to commute to ABAC with them exchange fuel expense sharing, available parking space, or reduce traffic jam.

(e) All factors mentioned in the questionnaire about preferred Carpool Club in ABAC by ABAC students are needed. However the two most important factors are Security and support by ABAC.

(f) ABAC students want to reduce transportation expense, time saving reduce pollution and social benefits as a result of joining the Carpool Club. However, they worry about safeness, time conflict and available driving member.

(g) Finally, carpool club is possible to establish in ABAC. There are about 40% of the students that will join Carpool club. However, many students will join Carpool Club after it is established with success.

5.2 Research Recommendation

a) Carpool club should be officially established to solve the traffic problem and limited parking space.

b) ABAC should support this program by finding parking spaces that free of charge or low charge for members. Money support is a good option for this program.

c) Management team should be set and management members should come from student council, clubs, faculty members and deans.

d) Rules and regulations should be carefully set and accepted by all members. However safety and availability is a major concern.

e) Promotion and campaign is important to give student knowledge about carpool and persuade students to join the club.

f) Now ABAC has many clubs that is officially registered to student council. They can automatically be members of Carpool Club.

g) Internet and technology can be adopted for carpool club such as online registration, online roadmap, online schedule, etc. Wireless Application Protocol (WAP) which users can access the Internet by mobile phone can be adopted if WAP is widely used in the future.

h) Monitoring the result of this program should be regularly done for finding the mistakes of this program and correct it.

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APPENDIX A
QUESTIONNAIRE

Questionnaire

Instruction : This questionnaire is a partial fulfillment of a Final Report of the three-credit course, CE 6998 Project for the degree of Master of Science in Computer and Engineering Management. It is aimed at identifying student behavior; attitude and factors influence the success of Carpool Club. It divided into 2 parts. I would appreciate it if you could fill in the questionnaire with your true opinions and facts. Your responses will be kept strictly confidential. Thank for your co-operation.

Part 1

Personal Data

Please fill in the blank or mark X in the box of your choice.

1. What is your gender?

o 1.1 Male

o 1.2 Female

2. How old are you?

Li 2.1 Under 18

o 2.2 18-20

o 2.3 Above 20

o 2.4 Other, specify_____

3. What is your monthly income?

o 3.1 Below 5000

o 3.2 5001-10000

o 3.3 10001-15000

o 3.4 15001-20000

o 3.5 Higher than 20000

4. What is your source of your income?

o 4.1 Parents

o 4.2 Yourself

Cl 4.3 Cousins

o 4.4 Other, specify_____

5. What is your faculty?

o 5.1 **BBA**

o 5.2 Art

❑ 5.3 Engineering

❑ 5.4 Science

❑ 5.5 Nurse

❑ 5.6 Law

❑ 5.7 Risk Management

❑ 5.8 Other, specify_____

6. What is your academic year?

❑ 6.1 1st year

❑ 6.2 2nd year

❑ 6.3 3td year

❑ 6.4 4th year

❑ 6.5 Other, specify_____

7. How do you usually commute to ABAC (Huamark Campus)?

❑ 7.1 Drive alone

❑ 7.2 Drive with friends

❑ 7.3 Sent by home car driver

❑ 7.4 By friend car

❑ 7.5 Other, specify_____

8. How many passengers that commutes with you? (included yourself)

❑ 8.1 1 person

❑ 8.2 2 persons

❑ 8.3 3 persons

❑ 8.4 4 persons

❑ 8.5 5 persons and Above

9. What period of time do you need to come to ABAC (Huamark Campus)?

❑ 9.1 06:30-08:00 AM

❑ 9.2 08:00-09:30 AM

❑ 9.3 09:30-11:00 AM

❑ 9.4 11:00-12:30 PM

❑ 9.5 12:30-14:00 PM

❑ 9.6 14:00-15:30 PM

❑ 9.7 15:30-17:00 PM

❑ 9.8 17:00-18:30 PM

10. What period of time do you leave ABAC (Huamark Campus)?

- ❑ 10.1 09:30-11:00 AM
- ❑ 10.2 11:00-12:30 PM
- ❑ 10.3 12:30-14:00 PM
- ❑ 10.4 14:00-15:30 PM
- ❑ 10.5 15:30-17:00 PM
- ❑ 10.6 17:00-18:30 PM
- ❑ 10.7 18:30-21:00 PM
- ❑ 10.8 After 21:00 PM

11. Which day you usually come to ABAC (Huamark Campus)? (you can select more than 1 choice)

- ❑ 11.1 Monday
- ❑ 11.2 Tuesday
- ❑ 11.3 Wednesday
- ❑ 11.4 Thursday
- ❑ 11.5 Friday
- ❑ 11.6 Saturday
- ❑ 11.7 Sunday

Part 2

12. What is the period of the day do you think traffic is the worst ABAC (Huamark Campus)?

- ❑ 12.1 06:30-09:30 AM
- ❑ 12.2 09:30-12:30 PM
- ❑ 12.3 12:30-15:30 PM
- ❑ 12.4 15:30-18:30 PM
- ❑ 12.5 After 18:30 PM
- ❑ 12.6 Other, specify _____

13. If you normally drive to ABAC, how do you think about finding a parking lot in ABAC (Huamark Campus)?

- ❑ 13.1 Very difficult
- ❑ 13.2 Difficult
- ❑ 13.3 Normal
- ❑ 13.4 Easy
- ❑ 13.5 Very easy
- ❑ 13.6 Other, specify _____

14. Usually, how long would you take to find a parking lot?

❑ 14.1 Less than 5 minutes

❑ 14.2 5 - 10 minutes

❑ 14.3 10 -15 minutes

❑ 14.4 15 - 30 minutes

❑ 14.5 More than 30 minutes

15. Where do you park your car when you come to ABAC (Huamark Campus)?

❑ 15.1 Find available parking space from private parking lot around ABAC

❑ 15.2 Have monthly car park from private parking lot Around ABAC

❑ 15.3 Find free car park

❑ 15.4 Find available parking space from ABAC parking lot(Safe Park)

❑ 15.5 Have monthly car park from ABAC parking lot(Safe Park)

❑ 15.6 Other, specify _____

16. Do you prefer anyone to company you to come to ABAC (Huamark Campus)?

❑ 16.1 Yes

❑ 16.2 No

17. How do you feel about having the stranger come to ABAC (Huamark Campus) with you in the same car?

❑ 17.1 Scare

❑ 17.2 Normal

❑ 17.3 Safe

❑ 17.4 Other, specify _____

18.Do you mine if the stranger that come to ABAC with you is ABAC Students?

❑ 18.1 Scare

❑ 18.2 Normal

❑ 18.3 Safe

❑ 18.4 Other, specify_____

19. Will you accept some ABAC student come to ABAC with your in the same car if they will share your fuel expense?

❑ 19.1 Accept

❑ 19.2 Not accept

20. Will you accept some ABAC student come to ABAC with your in the same car if it will reduce traffic problem around ABAC (Huamark Campus)?

Ei 20.1 Accept

o 20.2 Not accept

21. Will you accept some ABAC student come to ABAC with your in the same car if parking space will be available for you?

❑ 21.1 Accept

a 21.2 Not accept

"Carpool is a group of people who travel together especially to work or school, usually in a different member's car each day. Carpooling is cheaper and more environmentally friendly than commuting alone in your car every day. This concept is popular in U.S. Carpool Club is a club that organize for manage ridesharing program for t he member which cheaper and more environmentally friendly than commuting alone in your car every day. This concept is popular in U.S."

22. If Carpool Club exit in ABAC, how do you think about these factors on the club? Please mark (X) one of these scales for each factor.

Factors	Opinion				
	Absolutely Important	Important	Normal	Not important	Absolutely not important
22.01 Officially organized by ABAC					
22.02 Secure for members					
22.03 Supported by ABAC (ex. Giving free parking lots for members)					
22.04 Reliable management team					
22.05 Variable route choices					
22.06 Many cars for members to select					
22.07 Qualified members only					

22.08 Low charges for commuters					
22.09 High compensation for driving members					
22.10 Supported by all clubs in ABAC					
22.11 Information support through internet					

23. Which source that you ever heard about Carpool?

- ❑ 23.1 Parents
- ❑ 23.2 Friends
- ❑ 23.3 Instructors
- ❑ 23.4 Boy/Girlfriends
- ❑ 23.5 Never heard
- ❑ 23.6 Other, specify_____

24. What do you think is/are advantage(s) of a car pool club?
(Can select more than one answer)

- o 24.1 Time saving
- ❑ 24.2 Economical
- ❑ 24.3 Social benefits
- ❑ 24.4 Learn to share and sacrifice
- ❑ 24.5 Air pollution reduction
- ❑ 24.6 Other, specify_____

25. What do you think is/are disadvantage(s) of a car pool club?
(Can select more than one answer)

- o 25.1 Not safe for driving members
- ❑ 25.2 Not safe for commuting members
- ❑ 25.3 Time conflict for driving and commuting members
- o 25.4 Driving members may not be available everyday
- ❑ 25.5 Other, specify_____

26. It is possible to operate Carpool Club in ABAC?

o 26.1 Possible

Li 26.2 Impossible

27. If there is a car pool club in ABAC, will you join?

o 27.1 Yes because_____

❑ 27.2 No because_____

o 27.3 Other, specify_____

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